Accreditation

Stanford University is accredited by the Accrediting Commission for Senior Colleges and Universities of the Western Association of Schools and Colleges. In addition, certain programs of the University have specialized accreditation. For information, contact the Office of the Registrar.

Statement Of Nondiscriminatory Policy

Stanford University admits students of either sex and any race, color, religion, sexual orientation, or national and ethnic origin to all the rights, privileges, programs, and activities generally accorded or made available to students at the University. It does not discriminate against students on the basis of sex, race, age, color, disability, religion, sexual orientation, or national and ethnic origin in the administration of its educational policies, admissions policies, scholarships and loan programs, and athletic and other University-administered programs.

Every effort is made to ensure the accuracy of the information available at the time copy is prepared for this bulletin. The University reserves the right to make changes at any time without prior notice. The bulletin is also available on the web site at: www-leland.stanford.edu/dept/registrar/bulletin/.

Stanford, California
ACADEMIC CALENDAR 1997-98

AUTUMN QUARTER

Sep 23 (Tue)  Last day to arrange payment of University fees
24 (Wed)  Instruction begins
Sep 25 (Thu)  Conferall of degrees—Summer Quarter
Nov 23 (Sun)  Last day for filing A.B., B.S., and B.A.S. application for January (Autumn Quarter) conferral
Nov 27-30 (Thu-Sun)  Thanksgiving recess (*no classes*)
Dec 5 (Fri)  Last day for filing candidacy applications for Educational Specialist or Engineer degree for April (Winter Quarter) conferral
5 (Fri)  Last day for filing University thesis, D.M.A. final project, Ph.D. dissertation, and Graduation Application for January (Autumn Quarter) conferral of graduate degree
8-12 (Mon-Fri)  End-Quarter examinations

WINTER QUARTER

Jan 5 (Mon)  Last day to arrange payment of University fees
6 (Tue)  Instruction begins
8 (Thu)  Conferall of degrees—Autumn Quarter
19 (Mon)  Observance of Martin Luther King Day (*holiday, no classes*)
Feb 16 (Mon)  Observance of Presidents’ Day (*holiday, no classes*)
22 (Sun)  Last day for filing A.B., B.S., and B.A.S. application for April (Winter Quarter) and June (Spring Quarter) conferral
22 (Sun)  Last day for filing graduate graduation application for June commencement
Mar 8 (Sun)  Observance of Founders’ Day
13 (Fri)  Last day for filing candidacy applications for Educational Specialist or Engineer degree for June (Spring Quarter) conferral
13 (Fri)  Last day for filing University thesis, D.M.A. final project, Ph.D. dissertation, and Graduation Application for April (Winter Quarter) conferral of graduate degree
16-20 (Mon-Fri)  End-Quarter examinations

SPRING QUARTER

Mar 30 (Mon)  Filing deadline for matriculated undergraduate financial aid applications; last day to arrange payment of University fees
31 (Tue)  Instruction begins
Apr 2 (Thu)  Conferall of degrees—Winter Quarter
May 25 (Mon)  Observance of Memorial Day (*holiday, no classes*)
June 3 (Wed)  Last day for filing candidacy applications for Educational Specialist or Engineer degree for September (Summer Quarter) conferral
3 (Wed)  Last day for filing University thesis, D.M.A. final project, Ph.D. dissertation, and Graduation Application for June (Spring Quarter) conferral of graduate degree
4 (Thu)  Day before finals, no classes
5-10 (Fri-Wed)  End-Quarter examinations
13 (Sat)  Baccalaureate Saturday and Senior Class Day
14 (Sun)  Commencement

SUMMER QUARTER

22 (Mon)  Last day to arrange payment of University fees
23 (Tue)  Instruction begins
July 3 (Fri)  Independence Day (*holiday observance, no classes*)
Aug 14-15 (Fri-Sat)  Eight-week term examinations
15 (Sat)  Eight-week term closes
24 (Mon)  Last day for filing candidacy applications for Educational Specialist or Engineer degree for January (Autumn Quarter) conferral
24 (Mon)  Last day for filing University thesis, D.M.A. final project, Ph.D. dissertation, and Graduation Application for October (Summer Quarter) conferral of graduate degree
31 (Mon)  Quarter closes
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HISTORY OF THE UNIVERSITY

On November 14, 1885, Senator and Mrs. Leland Stanford executed the Founding Grant of The Leland Stanford Junior University. Three days later they called together the 24 prominent men who had been chosen to become the University’s first trustees and presented them with this historic document, which Leland Stanford himself had dictated. The document, with various amendments, legislative acts, and court decrees, remains as the University’s charter. In bold, sweeping language it stipulates that the objectives of the University are “to qualify students for personal success and direct usefulness in life; and to promote the public welfare by exercising an influence in behalf of humanity and civilization, teaching the blessings of liberty regulated by law, and inculcating love and reverence for the great principles of government as derived from the inalienable rights of man to life, liberty, and the pursuit of happiness."

The University bears the name of the Stanfords’ only child (although it is usually referred to simply as “Stanford University”). Leland Junior died of typhoid fever in Florence, Italy in 1884 just before his 16th birthday. His parents had come to California in 1852 and, although he was schooled as a lawyer, Mr. Stanford entered the mercantile business with his brothers in the gold fields. They established large-scale operations in Sacramento, where Mr. Stanford became a leader in business and politics. He was one of the “Big Four” who built the western link of the first transcontinental railroad and was elected Governor of California and later United States Senator. One of the founders of the Republican Party in California, he was an ardent follower of Abraham Lincoln and is credited with keeping California in the Union during the Civil War.

Almost immediately after the death of their son, the Stanfords decided to found a university in his memory on their vast country estate on the San Francisco Peninsula. Although they consulted with several of the presidents of leading institutions, they were not content to model their university on eastern schools. “Of all the young men who come to me with letters of introduction from friends in the East, the most helpless are college young men,” the Governor said. As the Stanfords’ thoughts matured, their ideas of “practical education” enlarged until they arrived at the concept of producing cultured and useful citizens who were especially prepared for personal success in their chosen professions. In a statement of the case for liberal education that was remarkable for its time, Stanford wrote, “I attach great importance to general literature for the enlargement of the mind and for giving business capacity. I think I have noticed that technically educated boys do not make the most successful businessmen. The imagination needs to be cultivated and developed to assure success in life. A man will never construct anything he cannot conceive.”

The cornerstone was laid May 14, 1887, and instruction began October 1, 1891. At the dedication ceremony, David Starr Jordan, the first President, stressed what has been the constant task of the University: to strengthen its students as individuals so that they are better fitted to serve a leading role in a free society. “We hope,” Dr. Jordan said on the opening day, “to give our students the priceless legacy of the educated man, the power of knowing what really is. The higher education should help to free them from the dead hands of old traditions and to enable them to form opinions worthy of the new evidence each new day brings before them.”

The first student body consisted of 559 men and women, many more than had been expected, and the original faculty of 17 was expanded to 29 for the second year. From the beginning, Stanford was coeducational and, like Johns Hopkins and Cornell, followed the German model of providing graduate as well as undergraduate instruction and stressing research along with teaching. Dr. Jordan installed the major subject system at the outset, and English was the only subject required for entrance.

By 1916 the 125 Academic Council members were organized into 26 departments, each independent of the others. Ray Lyman Wilbur, who became the University’s third president, undertook the arduous, ten-year job of organizing the departments into schools. Several regroupings occurred thereafter, but since 1948 the school has been organized as follows: Business, Earth Sciences, Education, Engineering, Humanities and Sciences, Law, and Medicine.

Within the seven schools are approximately 70 departments. In addition, more than 30 institutes, centers, programs, and laboratories have been organized outside the schools. Some of the major ones are the Center for Integrated Systems; the Institute for International Studies; the Hoover Institution on War, Revolution and Peace; the Stanford Linear Accelerator Center; and the W. W. Hansen Experimental Physics Laboratory.

Stanford early acquired a reputation as an important regional institution, especially at the undergraduate level, but it was not until the mid-1950s, during the administration of President J. E. Wallace Sterling, that it achieved national and international status as a major teaching and re-
search university. Geography, demography, and the federal government's recognition of its stake in graduate education, based on wartime experience, were contributing factors. In 1930 Stanford granted 41 Ph.D. degrees. By 1950 the number was 100, and in 1986 it was 517.

The University does not use any racial, religious, ethnic, geographic, or gender-related quotas in admissions. It is committed to the principles of Affirmative Action in the admission of students and in the employment of faculty and staff. In 1995-96, the completion or graduation rate for students who entered Stanford University full-time in 1990 was 94 percent. Enrollment in Autumn Quarter 1996 totaled 13,881, of whom 6,550 were undergraduates and 7,261 were graduate students. Blacks, Hispanics, Puerto Ricans, and Native Americans numbered 1,345 undergraduates and 746 at the graduate level. Stanford awarded 4,644 degrees in 1995-96, of which 1,744 were baccalaureate and 2,900 were advanced degrees.

Among the 1,487 faculty are 12 Nobel laureates, 107 members of the National Academy of Sciences, 194 members of the American Academy of Arts and Sciences, 68 members of the National Academy of Engineering, 19 members of the National Academy of Education, 20 winners of the National Medal of Science, 34 members of the American Philosophical Society, 4 Pulitzer Prize winners, and 15 MacArthur Prize winners.

**CAMPUS AND BUILDINGS**

Stanford University, 35 miles southeast of San Francisco and 20 miles northwest of San Jose, is on a peninsula between the Pacific Ocean and San Francisco Bay, an area noted for its mild climate, sunny days, cool nights, and infrequent winter frosts. The 8,180 acres of Stanford land stretch from Santa Clara Valley into the foothills of the Santa Cruz Mountains and are bordered by the cities of Palo Alto, Menlo Park, Los Altos, Los Altos Hills, Portola Valley, and Woodside.

The campus occupies what was Governor Leland Stanford's Palo Alto farm and the favorite residence of the Stanford family. Governor Stanford purchased an existing estate in 1876 and later acquired much of the land in the local watershed for his stock farm, orchards, and vineyards.

The name of the farm came from the tree El Palo Alto, a venerable coast redwood (*Sequoia sempervirens*), which still stands near the northwest corner of the property on the edge of San Francisquito Creek. The tree was named in the 1700s by Spanish explorers, to whom it was an important landmark.

On the farm, Stanford developed his own methods of selection, breeding, and training horses, particularly trotters. At first he was ridiculed by the trotting fraternity, then equivalent to today's professional football fraternity, but not for long. Between 1880 and 1895, no less than 19 world records were set under the Palo Alto colors. In fact, at one time Stanford’s horses held all the world records then in existence. The handsomely restored Red Barn near the Stanford Golf Course is one of the few remaining buildings of an immense training establishment. Near it, in collaboration with the Governor, Eadward Muybridge conducted experiments in multiple-exposure photography of horses trotting, which eventually led to the development of modern motion pictures.

The Stanfords gave the farm to the University in the Founding Grant in 1885. They financed the costs of construction and operation of the University until 1903 when surviving founder Jane Stanford turned over control to the Board of Trustees. The founding gift was in excess of $21 million, not including the land and buildings.

The Founding Grant decrees that the land—then totalling 8,847 acres—shall never be sold. Over the years, however, about 670 acres have been condemned by government bodies for schools, highways, a veterans' hospital, and other public uses. Of the remainder, approximately 5,800 acres have been reserved for educational uses, including the academic plant, faculty residential areas, and some 2,500 acres in open-land uses such as an arboretum, a golf course, and a biological preserve. Some 900 acres are under lease development for industrial research, commercial, and other income-producing uses.

Frederick Law Olmsted, the designer of Central Park in New York, worked out the general concept for the University grounds and buildings. A brilliant young Boston architect, Charles Allerton Coolidge, further developed the concept in the style of his late mentor, Henry Hobson Richardson. The style, called Richardsonian Romanesque, is a blend of Romanesque and Mission Revival architecture. It is characterized by rectilinear sandstone buildings joined by covered arcades formed of successive half-circle arches, the latter being supported by short columns with decorated capitals.
University Librarian and Director of Academic Information Resources: Michael A. Keller
Dean of Graduate School of Business: A. Michael Spence
Dean of Continuing Studies Program: Marsh McCall
Dean of School of Earth Sciences: Franklin M. Orr, Jr.
Dean of School of Education: Richard J. Shaver-Isen
Dean of School of Engineering: John L. Hennessy
Director of Hoover Institution: John Raisian
Dean of School of Humanities and Sciences: John B. Shoven
Dean of School of Law: Paul A. Brest
Dean of School of Medicine: Eugene A. Bauer
Director of Stanford Linear Accelerator Center: Burton Richter

ORGANIZATION

BOARD OF TRUSTEES

Powers and Duties—The Board of Trustees is custodian of the endowment and all properties of the University. The Board administers the invested funds, sets the annual budget, and determines policies for operation and control of the University. The powers and duties of the Board of Trustees derive from the Founding Grant, amendments, legislation, and court decrees. In addition, the Board operates under its own bylaws and a series of resolutions on major policy.

Membership—Board membership is set at 35, including the President of the University who serves ex officio and with vote. Trustees serve a five-year term and are eligible for appointment to one additional five-year term. At the conclusion of that term, a Trustee is not eligible for re-election until after a lapse of one year. Eight of the Trustees are elected or appointed in accordance with the Rules Governing the Election or Appointment of Alumni Nominated Trustees. Four of the Alumni Nominated Trustees must be 35 years of age or under and four older than 35 when elected. They serve a five-year term.

Officers of the Board—The officers of the board are a chair, one or more vice chairs, and a secretary. Officers are elected to one-year terms at the annual meeting in June. Their terms of office begin July 1.

Committees—Standing committees of the Board are Academic Policy, Planning, and Management; Alumni and External Affairs; Audit; Development; Finance; Land and Buildings; and Medical Center. Special committees include Compensation, Investment Responsibility, Litigation, and Nominations.

Meetings—The Board generally meets five times each year.

THE PRESIDENT

The Founding Grant prescribes that the Board of Trustees shall appoint the President of the University and that the Board shall give to the President the following powers:
To prescribe the duties of the professors and teachers.
To prescribe and enforce the course of study and the mode and manner of teaching.
Such other powers as will enable the President to control the educational part of the University to such an extent that the President may justly be held responsible for the course of study therein and for the good conduct and capacity of the professors and teachers.

The President is also responsible for the management of financial and business affairs of the University, including operation of the physical plant.

The President appoints the following, subject to confirmation by the Board: Provost, Vice President for Business Affairs and Chief Financial Officer, Vice President for Development, and General Counsel. In the inability of the person appointed President to act as President, the Provost shall be Acting President.

UNIVERSITY COMMITTEES

University committees are appointed by and are primarily responsible to the President. Such committees deal with matters on which the responsibility for recommendation or action is clearly diffused among different constituencies of the University. In accordance with the Report on the Committee Structure of the University, Academic Council members are appointed to University committees on nomination of the Senate Committee on Committees and student members on nomination of the Associated Students of Stanford University (ASSU) Committee on Nominations. The President takes the initiative in the appointment of staff members to such committees. Although immediately responsible to the President, University committees may be called upon to report to the Senate of the Academic Council or the ASSU Senate. Charges to such committees are set by the President on recommendation of the Committee on Committees and others. There are nine standing University committees, as follows:
Advisory Panel on Investment Responsibility (APIR)
Committee on Athletics, Physical Education, and Recreation (C-APER)
Committee on Faculty and Staff Benefits (C-FSB)
Committee on Health and Safety (C-HS)
Committee on Land and Building Development (C-LBD)
Committee on Public Events (C-PE)
Editorial Board of the Stanford University Press (EB-SUP)
KZSU Board of Directors
Panel on Outdoor Art

Additionally there are six standing administrative panels which are appointed by the President, and which report to him through the Vice Provost and Dean of Research and Graduate Study:
Administrative Panel on Biosafety
Administrative Panel on Human Subjects in Medical Research-A
Administrative Panel on Human Subjects in Medical Research-D
Administrative Panel on Human Subjects in Non-Medical Research
Administrative Panel on Laboratory Animal Care
Administrative Panel on Radiological Safety

PROVOST

The Provost, as the chief academic and budget officer, administers the academic program (instruction and research in schools and other unaffiliated units) and University services in support of the academic program (student affairs, libraries and information resources, and institutional planning). In the absence or inability of the President to act, the Provost becomes the Acting President of the University. The Provost shares with the President conduct of the University's relations with other educational institutions, groups, and associations. Principal officers reporting to the Provost are the Deans of Schools, the Vice Provost and Dean of Research and Graduate Policy, the Vice Provost for Student Services, the University Librarian and Director of Academic Information Resources, the Vice Provost for Faculty Recruitment and Development, the Vice Provost and Dean for Institutional Planning and Operations, the Vice Provost for Budget and Auxiliary Services, the Vice Provost for Undergraduate Education, and the Director of Athletics.

Schools of the University—The program of instruction in the University is organized in the following schools:
Graduate School of Business
School of Earth Sciences
School of Education
School of Engineering
School of Humanities and Sciences
School of Law
School of Medicine

THE ACADEMIC COUNCIL

According to the Articles of Organization of the Faculty, originally adopted by the Board of Trustees in 1904 and revised in 1977, the powers and authority of the faculty are vested in the Academic Council consisting of: (1) the President of the University; (2) tenure-line faculty—Assistant, Associate, and Full Professor; (3) nontenure-line faculty—Associate and Full Professor followed by the parenthetical notation (Teaching), (Performance), (Applied Research), or (Clinical); (4) nontenure-line research faculty—Research Assistant Professor, Associate Professor (Research), Professor (Research); (5) Senior Fellows in specified policy centers and institutes; and (6) certain specified officers of academic administration.

In the Spring of 1968, the Academic Council approved the charter for a Senate to be composed of 55 representatives elected by the Hare System of Proportional Representation and, as ex officio nonvoting members, certain major officers of academic administration.

In the allocation of representation, each school constitutes a major constituency. The Senate may create from time to time other major constituencies as conditions warrant. Approximately one-half of the representatives are allocated to constituencies on the basis of the number of students registered in those constituencies and the remainder on the basis of the number of members of the Academic Council from each constituency.

COMMITTEES

Committees of the Academic Council are created by and responsible to the Senate of the Academic Council and are appointed by the Committee on Academic Committees of the Senate. Such committees deal with matters on which the primary responsibility for action and decision lies with the Academic Council or, by delegation, the Senate. Pursuant to the Senate’s acceptance on September 25, 1969 of the Report from the Committee on Committees on the Committee Structure of the University and subsequent Senate action, the Senate has established seven standing Committees of the Academic Council, as follows:
Committee on Academic Appraisal and Achievement (C-AAA)
Committee on Academic Computing and Information Systems (C-ACIS)
Committee on Graduate Studies (C-GS)
Committee on Libraries (C-Lib)
Committee on Research (C-Res)
Committee on Undergraduate Admissions and Financial Aids (C-UAFA)
Committee on Undergraduate Studies (C-US)

Information regarding charges to these committees is available from the Office of the Academic Secretary to the University.

ASSOCIATED STUDENTS

Two weeks after the University opened in 1891, students met to form the Associated Students of Stanford University (ASSU). All registered students are members of the Association. They are governed by the ASSU Constitution and Bylaws, which was last revised and approved by student vote in April 1996, and approved by the President in May 1996.
Executive—The President and Vice President serve as the chief executives and representatives for the Association. The Financial Manager acts as business manager of the ASSU and controller of the Students' Organizations Fund, wherein ASSU and student organization funds are deposited.

Legislative—The ASSU Senate is composed of 30 elected representatives, 15 from the undergraduate and graduate communities. The Senate elects its own chair and meets every other week to discuss and act on issues pertinent to student life at Stanford. The Senate has responsibility to determine the budget of the Association and its agencies, and their budgetary, financial, investment, business, and operating policies, and to establish rules ensuring that funds derived from fees levied upon the members of the Association are expended and accounted for properly.

Judicial—An ASSU Constitutional Council evaluates the constitutionality of acts of the Senate or President. For information about University judicial policies, see “The Legislative and Judicial Charter” section of this bulletin.
ADMISSION AND FINANCIAL AID

ADMISSION

UNDERGRADUATE MATRICULATED STUDY

In order to preserve the residential character of the University and to maintain a favorable student-faculty ratio, Stanford has a limited undergraduate enrollment. The anticipated size of the freshman class is 1,610 students. Between 150 and 200 transfer students, entering either the sophomore or junior class, are also admitted each year. For both freshman and transfer admission, the University receives many more applications from qualified students than there are places available.

Stanford's undergraduate community is drawn from throughout the United States and many other countries. It includes men and women whose abilities, intellectual interests, and personal qualities will allow them to benefit from the University's wide range of teaching and research programs in the humanities, sciences, and engineering. The University admits students with highly developed skills in particular areas, as well as those with versatility in a number of fields. A comprehensive financial aid program aims to promote broad socioeconomic representation. Stanford is committed to meeting the University-computed financial need of each admitted student, and admission decisions are made without regard to the applicant's economic resources except in the case of some international students.

Affirmative action programs encourage development of a truly multicultural community, and special effort is made to attract, enroll, and provide support services for a group of undergraduates that is diverse in many ways. Admission practices are in accordance with University policies on nondiscrimination, and there are no restrictive quotas of any kind.

The primary criterion for admission is academic excellence: a compound of exceptional ability, scholastic performance in relation to available opportunities, and promise of intellectual growth. A secondary criterion is personal achievement outside the classroom in a range of pursuits including academic activities, the creative and performing arts, community service and leadership, athletics, and other extracurricular areas. Persistence and marked effectiveness in one or more distinct areas of personal achievement count for more than scattered involvement; initiative, curiosity, and vigor are also valued. The consideration of applicants for admission focuses on scholastic performance (grades, honors, and strength of program); scores on standardized national tests; documented perseverance and attainment in activities outside the classroom; quality of conception and writing in the personal statement; and enthusiasm of recommendations from staff at the secondary school. Admission officers base their comparative evaluation of each applicant on these criteria.

Applicants in certain categories may receive special consideration provided they meet the basic requirements of academic excellence and personal achievement. The University is committed to a substantial representation in the undergraduate community of African Americans, Mexican Americans, and Native American Indians, as well as others whose backgrounds and experience provide additional dimensions that will enhance the University's programs. Children of Stanford graduates receive preference in choices among applicants with approximately equal qualifications, and children of eligible Stanford faculty and staff receive favorable consideration provided they too meet basic requirements. The Department of Athletics may request special consideration for outstanding athletes. In all cases, the final decision on an application rests with the Dean of Admission and Financial Aid.

Stanford expects students to adhere to the principles of its Fundamental Standard: "to show both within and without the University such respect for order, morality, personal honor, and the rights of others as is demanded of good citizens." Admission officers select undergraduates they believe will benefit most from the University's resources, contribute to its community and to the education of their fellow students, and proceed to a lifetime of intellectual, personal, and societal accomplishment.

Since application procedures and requirements vary from year to year, specific information regarding application for admission as either a freshman or transfer student should be obtained by writing to the Office of Undergraduate Admission, Stanford University, Stanford, CA 94305-3005

NONMATRICULATED STUDY

Admission to Stanford as a nonmatriculated student during Autumn, Winter, and Spring Quarters is not routinely approved except under extenuating circumstances. Nonmatriculated students authorized to enroll at Stanford University are not admitted to any Stanford degree program and are permitted to register for a specific period, usually one, two, or three quarters. Financial assistance from Stanford University is not available. Acceptance as a nonmatriculated student does not guarantee subsequent admission as a matriculated
student. Students interested in nonmatriculated status during the Autumn, Winter, and Spring Quarters should contact the Registrar’s Office. The two most common categories of nonmatriculated undergraduate status are described below.

High School Nonmatriculated Students—Local high school students are eligible to be considered to attend Stanford as nonmatriculated students on a limited basis when they have exhausted all of the courses in a given discipline offered by their high school. Nonmatriculated high school students are permitted to enroll in one course per quarter and are required to pay the applicable tuition if admitted.

Post-High School Nonmatriculated Students—Stanford admits nonmatriculated undergraduates, who have already earned a high school degree or equivalent, only under extraordinary circumstances. Such students are required to pay full tuition if admitted, and are not eligible for financial assistance from Stanford University.

Students wishing to enroll as nonmatriculated students during Summer Quarter should contact the Summer Session Office for more information about the Summer Visitor Program. Admission to the Summer Visitor Program does not imply regular admission to Stanford for subsequent quarters or to one of Stanford’s regular degree programs.

GRADUATE MATRICULATED STUDY

Applicants from colleges and universities of recognized standing who hold a U.S. bachelor’s degree or its equivalent are eligible to be considered for admission for graduate study. Details regarding degrees offered in specific departments are given in the Guide to Graduate Admission included with application materials. The number of applicants who can be admitted for work in a particular field of study at any time is limited by the facilities of the school or department and by the number of matriculated students who continue their work in that field.

The Coterminal Degree Program—This program permits matriculated Stanford undergraduates to study for bachelor’s and master’s degrees simultaneously in the same or different departments. Application procedures are established by each master’s department. Applications must be submitted no earlier than the student’s completion of 105 units, or eighth quarter of undergraduate study. Stanford quarters and transfer quarters are included (calculated by dividing the total transferred units by fifteen). Applications must be submitted at least four quarters before the expected conferral of the master’s degree, and no later than the eleventh quarter of undergraduate study (Stanford quarters and transfer quarters included and calculated as above). Students who decide to apply for admission to master’s programs after these deadlines are not eligible for the coterminal program and must apply through the regular graduate admission process.

APPLICATION PROCESS

Specific information regarding test requirements, other application procedures and requirements, and closing dates for filing applications and supporting credentials for admission and financial aid are listed in the Guide to Graduate Admission.

Graduate fellowship funds and assistantships are committed in March for the entire period comprising Autumn, Winter, and Spring Quarters of the next academic year. Awards are seldom made to students who enter the University in Winter, Spring, and Summer Quarters; such applicants must meet the same financial aid application requirements as those entering in Autumn Quarter.

The Guide to Graduate Admission and application forms for graduate matriculated study may be obtained from Graduate Admissions, Registrar’s Office, Old Union, Stanford University, Stanford, California 94305-3005, except for the following programs:

Business—Applicants should write to Director of Admissions of the M.B.A., Ph.D., or Sloan Program, Graduate School of Business, Stanford University, Stanford, California 94305-5015 for information and application forms.

Law—Applicants should write to Director of Admissions, School of Law, Stanford University, Stanford, California 94305. The Law School Admissions Test is required.

M.D. Program—Applicants should write to Admissions Committee, School of Medicine, 851 Welch Road, Palo Alto, California 94304 for an AMCAS (American Medical College Application Service) application request card and information about the M.D. program. Applications and transcripts must be received by AMCAS by November 1. The Medical College Admissions Test is required.

Coterminal Master’s Program—Interested Stanford undergraduate students should contact directly the department in which they wish to pursue a master’s degree and must adhere to the application deadlines described in “The Coterminal Degree Program” above.

UNIVERSITY DIVISION

Under exceptional circumstances, students are accepted for matriculated graduate study without having obtained the bachelor’s (or equivalent foreign) degree. These exceptional admissions are classified as “University Division” students. Applicants are considered for University Division admission if (1) a normal course of study has not
been followed but high professional skills in the field of interest have been demonstrated; (2) the undergraduate record is exceptional and the applicant has obtained at least senior standing at an educational institution of recognized standing; or (3) the undergraduate record at a foreign institution is exceptional and is considered by Stanford to represent an amount of work that is the equivalent of a bachelor's degree. University Division students may be required to complete additional course work to fulfill degree requirements.

NONMATRICULATED STUDY

Graduates of colleges and universities of recognized standing who hold a U.S. bachelor's degree or its equivalent are eligible to apply for nonmatriculated graduate student status. This status may be granted to students of demonstrated ability who are not seeking an advanced degree from Stanford University but who would benefit from course work at Stanford for a variety of reasons. A 3.0 or 'B' grade average in prior studies is required. Nonmatriculated admission is valid only for a given academic year or a part thereof. Students who wish to reenroll in a subsequent academic year must reapply.

Nonmatriculated students are not permitted to enroll in certain courses, such as those in the following departments or programs: Film and Broadcasting courses in Communication; graduate level courses in Psychology; all courses in Economics, Electrical Engineering, Industrial Engineering, and the School of Medicine. Nonmatriculated students receive academic credit for courses satisfactorily completed and may obtain an official transcript. They may use University facilities and services. In classes of limited enrollment, students in degree programs have priority. Nonmatriculated students may apply for housing but will have a low priority for assignment. No fellowships, assistantships, or Stanford loans are available for nonmatriculated students.

Nonmatriculated students who later apply for admission to a degree program must meet the standard admission requirements and should not anticipate special priority because of work completed as a nonmatriculated student. Students who are admitted to a degree program may apply a maximum of one quarter of nonmatriculated study toward the residency requirement for a master's degree and two quarters for the Engineer or Ph.D. degree.

Application forms for nonmatriculated status during the regular academic year are available from Graduate Admissions, Registrar's Office, Old Union, Stanford, CA 94305-3005. Deadlines for applying are included with the forms and are generally two months before the start of the quarter.

Applicants interested in nonmatriculated student status for the Summer Quarter only should contact the Summer Session Office, Building 590, Room 104, Stanford University, Stanford, CA 94305-3005.

POSTDOCTORAL SCHOLARS

Prospective postdoctoral scholars should write directly to the department in which they wish to study.

Postdoctoral scholars who are paid as Research Affiliates through Stanford grants and contracts must enroll as nonmatriculated graduate students each quarter of their appointments. They are thereby eligible for most student benefits. Scholars who are supported by other funds have the option of registering, except in the School of Medicine which requires that all postdoctoral scholars be registered. Postdoctoral scholars must have received the Ph.D. within the last three years or the M.D. within the last six years.

The School of Medicine has an additional special student category, the School of Medicine Fellow, which is open to those holding the M.D. for more than six years or the Ph.D. for more than three years and who have been invited to Stanford to undertake further training in modern medical technology.

Postdoctoral scholars who are not required to register as nonmatriculated students may request Visiting Scholar status. This option is available only to an individual who is visiting from an outside institution or organization, who has a doctoral degree or is a recognized expert in his or her field, and whose source of funding is not Stanford. Appointments are authorized by department chairs. Visiting scholars are not eligible for student benefits.

VISITING RESEARCHERS

In limited instances, it is to the benefit of Stanford faculty to permit persons who have not yet obtained a Ph.D. (or its foreign equivalent) or who are not recognized experts in their fields to engage in research on the Stanford campus using Stanford research facilities. Such instances might include students at other universities who are engaged in doctoral research in a field of interest to the faculty member, a person doing a laboratory rotation as part of a larger research study or grant, or employees of companies who are conducting research which requires specialized equipment available only at Stanford.

In these instances, since the person is not eligible for Visiting Scholar status, they may be eligible to register as nonmatriculated students in the Visiting Researcher category for a maximum of one year. Invited persons must be qualified to conduct research at a level comparable to that of other Stanford graduate students, and the research must be of benefit to Stanford as well as to the
visitor. Admission forms for Visiting Researchers are submitted to the Registrar's Office by the department issuing the invitation.

Visiting Researchers are charged the Permit to Attend for Services Only tuition rate quarterly and may waive the University's student medical insurance plan only if they have comparable coverage with another carrier. They may not enroll in any courses, but in quarters they are registered, are eligible for the usual student benefits of non-matriculated student status. Stanford cannot certify Visiting Researchers for deferment of U.S. educational loans. Citizens of other countries who enter the United States to be Visiting Researchers must have an IAP-66 issued by the Bechtel International Center and must register each quarter, including Summer, to maintain their visa status.

**VISAS FOR FOREIGN STUDENTS**

All students who are not U.S. citizens or permanent residents must obtain visas for their stay in the United States. The types of visas available for students are the following:

1. **Student Visa (F-1)**, obtained with an I-20 Certificate of Eligibility issued by Stanford University. The graduate student on an F-1 visa must enroll in a full course of study. The accompanying spouse or child enters on an F-2 visa. F-2 visa holders may not work.

2. **Exchange-Visitor Visa (J-1)**, obtained with an IAP-66 Certificate of Eligibility issued by Stanford University or a sponsoring agency. This visa is required for graduate students sponsored by certain agencies, foundations, and governments. In some cases, Exchange-Visitors must leave the United States at the conclusion of their programs, may not change visa status, and may not apply for permanent residency in the United States until they have returned to their home countries for at least two years. The spouse of an Exchange-Visitor enters on a J-2 visa and may, in some cases, obtain permission to work.

   The certificate of eligibility is issued to a student accepted for admission only upon receipt of evidence of satisfactory proficiency in the English language and certification of adequate financial support. A student transferring from another school must obtain a new visa with a Stanford certificate of eligibility.

   Information on visas is sent to admitted graduate students from the Graduate Admissions Office. Information on visas for postdoctoral scholars may be obtained from the Bechtel International Center.

   The University requires that all students who are not U.S. citizens or permanent residents maintain a visa status that allows registration as students.

**FINANCIAL AID**

**UNDERGRADUATE**

The University has a comprehensive need-based financial aid program for its undergraduate students (except some international students) who meet various conditions required by the state or federal government, the University, and other outside donors.

In awarding its own funds, the University assumes that students and their parents (or spouse, in the case of married students) accept the first and primary responsibility for meeting the standard educational costs established by the University. Additionally, Stanford expects financial aid applicants to apply for and use resources from state, federal, and private funding sources, contribute from their earnings during nonenrollment periods, and use student loans and part-time jobs to meet educational expenses. If Stanford determines that an applicant and his or her family cannot meet these expenses, the University may award loans, jobs, and scholarships or grants to help meet these costs. Stanford's policy generally is to exclude undergraduates from being considered financially independent of their parents for University-administered scholarship and grant aid unless the student is an orphan, a ward of the court, or at least age 25 or has an extremely adverse home situation.

In awarding Stanford financial aid funds to meet need, that is, any difference between the educational expenses and the University-determined family resources, Stanford first offers "self-help," which includes student loans and term-time job earnings eligibility. The University normally expects that during enrollment periods, students will work and borrow up to approximately 21 percent of the expenses. The self-help expectation may be lower for certain categories of students including those from very low-income families, those who are academically in the top five to ten percent of an entering class, and those who bring diversity to the Stanford student body. If the University-determined need is greater than the self-help expectation, Stanford awards scholarship or grant funds to meet the remaining need.

Scholarships or grants from outside private sources may change the University's financial aid award. The first $500 from private scholarship sources reduces the self-help (job and then the loan) component of the aid. If the student receives more than $500 in outside awards, Stanford will reduce its offer of scholarship or grant by half of the total amount beyond the first $500. The Financial Aid Office (FAO) will consider the remaining half of the total towards reducing the student's self-help. If the total in outside awards reduces the self-help calculation to the minimum expectation (approximately $3,500 for 1997-98), the
University reduces its own scholarship or grant offer dollar for dollar and notifies the student that the minimum reduction in self-help has been reached.

The University considers applicants for its own scholarship and grant support beyond the twelfth quarter only if enrollment is essential in order to complete the minimum requirements for the first baccalaureate degree or major. A student who must be enrolled beyond fifteen quarters is not deemed to be making satisfactory academic progress for financial aid purposes. Students who enroll for a fifth year in pursuit of a coterminal program, a minor, a second major, a second degree, or the B.A.S. degree are not eligible for University scholarship and grant consideration but may apply for student loans and jobs.

APPLICATION AND AWARD NOTIFICATION PROCESS
FILING DEADLINES

Prospective freshmen
- Early Decision 1, November 1, 1997
- Early Decision 2, December 1, 1997
- Regular Review, February 1, 1998
- March 15, 1998
- April 15, 1998

The documents the applicant must submit for financial aid consideration vary depending on the applicant's nationality and the type of funds sought.

U.S. citizens and permanent residents who wish to be considered for all available funding administered by Stanford should submit the following documents. Canadians file the following except the FAFSA.

1. Free Application For Student Aid (FAFSA), which must be processed by the federal processor. California residents must also submit a GPA Verification Form or SAT scores to the California Student Aid Commission (CSAC) by March 2, 1997, for Cal Grant consideration.
2. The PROFILE processed by the College Scholarship Service (CSS).
4. CSS's Divorced/Separated Parent's Statement (when applicable).

A complete application for U.S. citizens and permanent residents applying for Stafford loan consideration only include:
1. Free Application For Federal Student Aid (FAFSA), which must be processed by the federal processor

A complete application for international students (except Canadians) includes the Foreign Student Financial Aid Application and the Certificate of Finances.

Students whose application materials are filed after the published deadlines, who have not borrowed or worked in prior years, who have not secured all external funds such as Pell and Cal Grants, or whose level of need increases significantly from prior years can expect higher levels of self-help in their financial aid packages.

Applicants and their parents are required to submit accurate and complete information on all application documents. To monitor for accuracy and reliability of information, the University participates in a U.S. Department of Education project that samples the reliability of the data on a number of applications. The FAO may request documents, in addition to the application materials, to verify this information. Students may have their financial aid funds withheld or canceled if they fail to submit the information requested. Financial aid awards may change as a result of the verification process.

NOTIFICATION DATES

The FAO will notify freshman applicants who apply by the February filing date of their financial aid award in early April. Transfer applicants who submit complete applications by the March 15 filing date are normally notified of their financial aid award within 10 days of their notice of admission.

The FAO begins mailing award notices to continuing and returning applicants approximately the middle of July. Applicants who file after the filing date may not have a financial aid award for the beginning of the Autumn Quarter.

PAYMENT AND FINANCING OPTIONS

Students whose financial aid is not available at the time registration fees are due may use the University's Deferred Payment Plan.

Parent loan and financing options may help families of students receiving financial aid meet the expected parent contribution. Many of these options are also available to families who do not qualify or apply for financial aid but feel the need for some extended financial credit to help meet the costs of attendance. Parents should also contact their employers for information about programs that may be available to them as employees' benefits to help meet college costs.

GRADUATE

Academic departments at Stanford University offer financial support to many graduate students. Funds are most often targeted to doctoral
candidates and rarely cover all the costs of single students. Students usually need to use long-term loans, savings, liquidated assets, a spouse's earnings, or parental support in addition to Stanford aid. Students are urged to study full time in order to attain the degree as soon as possible. They should consider part-time employment only after consultation with their department advisers and if no other alternative is possible. Students fully supported by Stanford are limited to additional employment of no more than eight hours per week. Students with families to support or with medical or other special needs should budget income and expenses carefully. Loan funds alone may be insufficient to meet the expenses not covered by the Stanford award.

*Note*—No fellowships, assistantships, or loans are available for nonmatriculated students.

**FELLOWSHIPS AND ASSISTANTSHIPS**

Fellowships, research assistantships, and teaching assistantships provide funds for graduate student support. Departments determine the disposition of funds available for graduate fellowship and assistantship appointments. Academic merit and availability of funds are the primary considerations in the awarding of graduate financial support. The availability of aid varies considerably among departments and programs. Support offers range from partial tuition fellowships to awards that provide full tuition and a living stipend. Some departments admit only those students to whom they can offer support or who have guaranteed funds from outside sources. Other departments may offer admission but are unable to provide financial assistance due to limited financial resources. Very few awards are given for study toward terminal master's degrees.

Application procedures and deadlines for admission and financial aid are described in the *Guide to Graduate Admission*. Fellowships and assistantships are normally awarded between March 15 and April 15, in accordance with the Council of Graduate Schools resolution.

Fellowship and assistantship funds are given with the expectation that the student will receive no other award; acceptance of a Stanford award obliges the student to inform the department of any other aid received. The Stanford award may be adjusted (see "Outside Fellowships" below).

Recipients of all graduate fellowships and assistantships must register each quarter of their appointment.

**POSTDOCTORAL FELLOWSHIPS**

Stanford has two categories of postdoctoral scholars. Postdoctoral Research Affiliates are classified as advanced students who are employed on contracts and on research and training grants. Postdoctoral Fellows are categorized as advanced students whose funding is from outside sources, typically foundations and foreign governments. Inquiry should be made directly to the department.

**OUTSIDE FELLOWSHIPS**

Many Stanford graduate students hold fellowships won in national competition from outside agencies such as the National Science Foundation. Information on application procedures and terms of such fellowship programs may be obtained from reference materials in the applicant's current academic institution. If not, the student should write for information directly to the national office of the agency or foundation administering the program.

A student who receives support from an outside source must notify the department immediately. The Stanford award may be adjusted.

**LOANS**

Graduate students who believe they will require loan assistance can apply for Federal Stafford Student Loan, Federal Perkins Loan, and University Loan programs. Inquiries for publications outlining loan program terms can be directed to Financial Aid Office, Old Union, Room 322, Stanford, CA 94305-3021; phone (650) 723-3058. International students who are not permanent residents are not eligible for long-term loans.

*Application*—(The following information applies to all graduate students, except those in the Schools of Law and Business and in the M.D. program in the School of Medicine, who should receive information about the aid application process through their respective schools.) Graduate student loan information is sent after admission; a tear off portion of that brochure may be used to request a graduate loan application packet, including detailed loan program information, forms, and instructions. Required application documents are:

1. The results of filing the Free Application For Federal Student Aid (FAFSA) with the federal processor
2. Stanford Graduate Supplemental Application

Students who anticipate the need to use loan proceeds to pay Autumn Quarter bills should have their completed application filed with the FAO by June. The FAO will notify the student of loan eligibility, which is based on a review of computed financial need, satisfactory academic progress, level of indebtedness, credit history, and availability of funds.

*Debt Management*—The University encourages wise debt management. Software is available to help students plan for future repayment.

*Loan Consolidation*—The government currently offers a program that allows borrowers owing more than $7,500 in federal student loans to ex-
tend repayment up to 25 years and reduce the amount of monthly payments. A consolidated loan has an interest rate based on the weighted average of the loans being consolidated but at least nine percent and not more than 12 percent. Further information is available through the FAO.

Short-Term Loans—Small emergency loans up to a maximum of $500 are available to all students, including international students, upon demonstration of ability to repay the loan within three months. These loans are not available to pay University bills.

COTERMINAL STUDENTS

Stanford undergraduate scholarships and grants are reserved for students in their first four years of undergraduate study at Stanford. University graduate fellowships are rarely given to coterminal students, but some departments award research and teaching assistantships to coterminal master’s students. Students on half-time assistantships register for 9 units per quarter and accrue 62 percent of a full-tuition quarter of residency. Assistantships provide a salary but cover tuition expenses only for coterminal students who have completed 180 units before the quarter in which the assistantship is granted. Most private and federal graduate fellowships are awarded only to students who have received the bachelor’s degree. (California State Graduate Fellowships are available to coterminal students who have completed 180 units.)

HONORS COOPERATIVE PROGRAM

Under a graduate cooperative program in engineering and science, employees from over 200 companies in the San Francisco Bay area are released from work, with full compensation, to attend regular classes at Stanford. Most of these companies have joined a Stanford four-channel television network that enables students to observe live lectures with talk-back privileges in their own plants. For a list of participating companies, write to the Instructional Television Network, 401 Durand, Stanford University, Stanford, CA 94305.

VETERANS’ BENEFITS

Liaison between the University, its students, and the various federal, state, and local agencies concerned with veterans’ benefits is provided by the Office of the Registrar located in the Old Union Building. All students eligible to receive veterans’ benefits while attending the University are urged to complete arrangements with the appropriate agency well in advance of registration.

The University reserves the right to change at any time, without prior notice, tuition, room fees, board fees, or other charges.
ASSESSMENTS

TUITION

Regular tuition for the academic year, payable Autumn, Winter, and Spring Quarters, is as follows:

1997-98

All departments and schools (except those below) 7,100
Graduate Division in Engineering 7,580
Graduate School of Business 8,000
School of Medicine (M.D. Program) 8,795
School of Law (payable Autumn and Spring semesters) 12,083
J.D./M.B.A. Program (payable Autumn and Spring semesters) 12,083

Regular tuition fees apply to the undergraduates Overseas Studies and Stanford in Washington Programs. For Summer Quarter tuition rates and policies, see the Stanford University bulletin, Summer Session Catalogue, 1998.

Eligibility for registration at reduced tuition rates is described below. Tuition exceptions may also be made for illness, disability, pregnancy, new-parent relief, or other instances at the discretion of the Registrar. No reduction in tuition charges is made after the first two weeks of the quarter.

All students are strongly advised, before registering at less than the regular full-tuition rate, to consider the effects of that registration on their degree progress and on their eligibility for financial aid and awards, visas, deferment of student loans, and residency requirements.

UNDERGRADUATE STUDENTS

During Autumn, Winter, and Spring Quarters, undergraduates are expected to register at the regular full-tuition rate. Undergraduates who have completed at least twelve full-time quarters may petition to register at the 8-, 9-, or 10-unit rate for their final quarter.

Permit to Attend (auditing) status can be granted on a one-time basis to those for whom it is academically appropriate. The Permit to Attend rate is $1,760 per quarter in 1997-98. Undergraduates in the terminal quarter who are completing honors theses or clearing incomplete grades may petition, on a one-time basis, for Permit to Attend for Services Only registration. That rate is $865 per quarter in 1997-98 and does not permit any course enrollment or auditing.

During Summer Quarter, all Stanford undergraduates may register on a unit-basis (minimum 3 units).

GRADUATE STUDENTS

Matriculated graduate students are expected to register at the full-tuition rate applicable to their degree program, unless they are in a category which makes them eligible for reduced tuition.

The following reduced-tuition categories can be requested by matriculated graduate students in the final stages of their degree programs:

1. Advanced Graduate Registration (AGR): doctoral students who have been admitted to candidacy, registered for all required courses, and completed nine quarters of residency may request AGR status for 9-unit registration.

2. Terminal Graduate Registration (TGR): doctoral students who have been admitted to candidacy, completed all required courses and degree requirements other than the University oral exam and dissertation, accrued 10.5 quarters of residency, and submitted a Doctoral Dissertation Reading Committee form may request Terminal Graduate Registration status to complete their dissertations. Students pursuing Engineer degrees may apply for TGR status after admission to candidacy, completion of all required courses, and six quarters of residency. Students enrolled in master’s programs may apply for TGR status upon completion of all required courses and three quarters of residency only if their program requires a final master’s project.

TGR status may also be granted for one quarter only to a graduate student who is returning after a leave of absence or after reinstatement, or to graduate students who register for one final term to take a University Oral Examination, submit a thesis or dissertation, or file an Application to Graduate. Doctoral students applying for one-quarter TGR status must also meet the doctoral criteria above except that they need only nine quarters of residency. Requirements for one-quarter TGR for master’s and Engineer students are as above, but master’s students need not be in a program with a final writing project requirement to qualify.

Each quarter, all TGR students must enroll in the 801 (for master’s and Engineer students) or 802 (for doctoral students) course in their department for zero units, in the appropriate section for their adviser. TGR students register at a special tuition rate: $865 in 1997-98. Within certain restrictions, TGR students may enroll in additional courses, at the appropriate unit rate.
3. **Graduate Final Requirement Registration:**

Graduate students who need only a few remaining units to complete degree requirements or to qualify for TGR status, may register for one quarter on a unit basis (3 to 10 units) to cover the deficiency. This status may be used only once during a degree program.

Additional information on these registration categories is available from the Degree Progress Office in the Old Union.

Matriculated graduate students who have Stanford fellowships or assistantships that require less than full-tuition registration may register at the unit rate required by their award. Honors Cooperative students register at the unit rate.

During the Autumn, Winter, and Spring Quarters, matriculated graduate students in most departments may register at the 8-, 9-, or 10-unit rate if their enrollment plans are accepted by their departments. Students in the School of Engineering and the Departments of Applied Physics, Mathematics, Physics, and Statistics, because of school and department affiliation with the Honors Cooperative program, are not eligible to register at less than the full-tuition rate, unless they are eligible for one of the special categories above or a departmentally-approved exception. Students in the Schools of Law and Business, or the M.D. program in the School of Medicine, should consult appropriate school officers about tuition reduction eligibility.

Tuition exceptions may also be available for students who are faculty spouses, regular Stanford employees, or full-time educators in the Bay Area.

During Summer Quarter, most matriculated graduate students may register on the unit basis for 3 or more units. Students in schools and departments affiliated with the Honors Cooperative program, as listed above, may not register below the 12-unit rate (9-unit minimum in Statistics only).

Nonmatriculated graduate students pay the same tuition rates as matriculated students, but must register at the 8-unit rate or above. Postdoctoral scholars who are registered as students and Visiting Researchers enroll in no courses and pay the TGR rate. Within certain restrictions, postdoctoral students may enroll in courses if the appropriate unit rate for tuition is paid.

**COTERMINAL STUDENTS**

A coterminal student falls under graduate tuition assessment and adjustment policies as soon as s/he attains graduate standing (the quarter after completion of 180 units, or 225 if dual undergraduate degrees are being pursued). A coterminal student is not considered a graduate student for tuition purposes until the quarter after the one in which the student earns 180 units. The one exception is that a student who has been admitted to pursue a coterminal master's degree in the School of Engineering will start being charged according to the graduate Engineering tuition schedule, as soon as any one of the following conditions is met:

1. The student's undergraduate degree is conferred.
2. The student is granted any graduate aid.
3. The student has completed at least 180 units (including Stanford, transfer, and Advanced Placement units) and twelve quarters of registration.

Once charged under the graduate Engineering tuition schedule, the tuition will not revert thereafter to the undergraduate rate.

**INTERNATIONAL STUDENTS**

F1 or J1 visas are required by the U.S. Immigration and Naturalization Service. International students must be registered as full-time students during the academic year. Summer Quarter registration is not required. International graduate students comply with immigration regulations while enrolled for partial tuition if their Stanford fellowships or assistantships require part-time enrollment, if they are in AGR or TGR status, or if they are in the final quarter of a degree program. Nonmatriculated international students must register for at least 8 units.

**FEES**

**APPLICATION FEE**

Contact the Undergraduate Admissions Office for information about the undergraduate application fee and the Graduate Admissions section of the Registrar's Office for the current graduate application fee. Application fees for the School of Law, the School of Medicine, and the Graduate School of Business vary by program. Fees are payable at the time of application and are not refundable.

**ASSU FEES**

The Associated Students of Stanford University (ASSU) fees are established by student vote in Spring Quarter. Fees directly fund activities of students' organizations and not operations of ASSU. The 1997-98 fees are:

- Undergraduates—Autumn, 51; Winter, 50; Spring, 55
- Graduates—Autumn, 21; Winter, 22; Spring, 23
- Law—Autumn, 21; Spring, 45

Quarterly fees are assessed at registration. All fees are refundable. Refunds can be requested during the first three weeks of each quarter per instructions advertised in the Stanford Daily. Those eligible are mailed refund checks by the
eighth week of the quarter or receive credit on their University bill.

**DOCUMENT FEE**

Stanford charges a one-time Document Fee to all students admitted to new degree or non-degree programs in 1993 or later. The fee is paid once only, regardless of the number of degrees a student may ultimately pursue. It covers the cost of a variety of University administrative services such as enrollment and degree certification, course drops and adds, diplomas, official transcripts and their production, and the credentials files maintained in the Career Planning and Placement Center.

**HEALTH INSURANCE FEE**

The University requires all registered students to carry medical insurance to provide coverage for services not provided by Cowell Student Health Services. Students are enrolled in and charged for the Stanford student health insurance plan, unless they have completed waiver procedures by the second day of the term. Those who carry medical insurance through an alternate carrier are generally eligible for waiver of the Health Insurance Fee.

**SPECIAL FEES**

**New Student Orientation Fee**—A fee is charged to all entering undergraduates for the costs of orientation, including room and board, and for the cost of senior class dues to provide funds for later activities of the class. This fee is included in the acceptance deposit remitted by transfer students upon accepting their admissions and by freshmen upon registration.

**School of Law Course Materials Fee**—A fee is charged each semester to School of Law students for supplementary course materials.

**Late Fees**—Charges are imposed for late registration and late submission of Study Lists. Amounts are listed in the quarterly *Time Schedule*.

**Laboratory Fee**—Students in chemistry laboratory courses are charged a nonrefundable fee.

**Music Practice; Athletics, Physical Education, Recreation; and Dance**—Courses for which special fees are charged are indicated in the *Time Schedule*.

**Dissertation Fee**—Each Ph.D., D.M.A., and Ed.D. candidate is charged a fee to cover the cost of microfilming and binding the dissertation and the cost of publishing the abstract.

**International Scholar Service Fee**—A one-time fee for Visa authorization documents is charged to international postdoctoral and visiting scholars.

**Vehicle Registration Fee**—Students must register their motor vehicles with the campus Department of Public Safety. Parking permits may be purchased at Parking and Transportation, 855 Serra Street.

**HOUSING**

Bulletins with further information on housing rates are *Summer Session Catalogue*, 1998 for Summer Quarter; *School of Law* for Law School; *Overseas Studies* for Overseas Centers.

Campus housing rates are generally below local area market rents. The approximate room rates for the 1997-98 academic year are as follows:

<table>
<thead>
<tr>
<th>Residences</th>
<th>Aut</th>
<th>Win</th>
<th>Spr</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate dormitories andUniversity-operated houses</td>
<td>$1,296</td>
<td>1,186</td>
<td>1,155</td>
<td>3,637</td>
</tr>
<tr>
<td>Graduate dormitories</td>
<td>1,178</td>
<td>1,079</td>
<td>1,050</td>
<td>3,307</td>
</tr>
<tr>
<td>Self-operated houses</td>
<td>1,555</td>
<td>1,423</td>
<td>1,386</td>
<td>4,364</td>
</tr>
<tr>
<td>Co-ops and student-cleaned houses with professional cooks</td>
<td>1,387</td>
<td>1,269</td>
<td>1,236</td>
<td>3,892</td>
</tr>
<tr>
<td>Mirrielees (apartments)</td>
<td>1,464</td>
<td>1,340</td>
<td>1,305</td>
<td>4,109</td>
</tr>
<tr>
<td>Suites</td>
<td>1,447</td>
<td>1,326</td>
<td>1,291</td>
<td>4,064</td>
</tr>
<tr>
<td>Liliore Green Rains Houses (single graduate student apartments)</td>
<td>1,403</td>
<td>1,284</td>
<td>1,250</td>
<td>3,937</td>
</tr>
<tr>
<td>Escondido Village (single graduate student apartments)</td>
<td>1,403</td>
<td>1,284</td>
<td>1,250</td>
<td>3,937</td>
</tr>
<tr>
<td>1 bedroom (single occupancy)</td>
<td>2,466</td>
<td>2,258</td>
<td>2,198</td>
<td>6,922</td>
</tr>
<tr>
<td>1 bedroom (double occupancy)</td>
<td>1,233</td>
<td>1,129</td>
<td>1,099</td>
<td>3,461</td>
</tr>
<tr>
<td>2 bedroom</td>
<td>1,403</td>
<td>1,284</td>
<td>1,250</td>
<td>3,937</td>
</tr>
<tr>
<td>3 bedroom</td>
<td>1,314</td>
<td>1,203</td>
<td>1,172</td>
<td>3,689</td>
</tr>
<tr>
<td>Escondido Village (apartments for couples without children)</td>
<td>2,466</td>
<td>2,258</td>
<td>2,198</td>
<td>6,922</td>
</tr>
<tr>
<td>1 bedroom</td>
<td>2,806</td>
<td>2,568</td>
<td>2,500</td>
<td>7,874</td>
</tr>
<tr>
<td>2-bedroom loft</td>
<td>681</td>
<td>634</td>
<td>603</td>
<td>2,028</td>
</tr>
<tr>
<td>3-bedroom flat</td>
<td>934</td>
<td>896</td>
<td>866</td>
<td>2,796</td>
</tr>
<tr>
<td>4-bedroom flat</td>
<td>1,128</td>
<td>1,090</td>
<td>1,062</td>
<td>3,282</td>
</tr>
</tbody>
</table>

*All rates are approximate and subject to minor changes.

All rates are per person. Room rates are charged quarterly on the University Bill. Information on payment options and procedures is discussed in housing assignment information from Housing Assignment Services and is available in complete detail from the Bursar's Office, Room 104, Old Union, Stanford University, Stanford, CA 94305.

A quarterly house dues fee for students is generally determined by the local staff and/or residents of the house and may be included with room and board charges on the University Bill.
MEAL PLANS*

Meal plan rates are as follows for the 1997-98 academic year:

<table>
<thead>
<tr>
<th>Meal Plans</th>
<th>Quarterly Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aut</td>
</tr>
<tr>
<td>All-You-Can-Eat Plans: for residents of Branner, Lagunita, Moore, Roble, Stern, and Wilbur</td>
<td></td>
</tr>
<tr>
<td>19 meals/week</td>
<td>$1,398</td>
</tr>
<tr>
<td>14 meals/week</td>
<td>1,313</td>
</tr>
<tr>
<td>Plus Plan:</td>
<td></td>
</tr>
<tr>
<td>for residents of Branner, Lagunita, Moore, Roble, Stern, and Wilbur</td>
<td></td>
</tr>
<tr>
<td>12 meals/week plus points</td>
<td>1,398</td>
</tr>
<tr>
<td>A La Carte Plans†: for residents of Manzanita Park and Sterling Quadrangle</td>
<td></td>
</tr>
<tr>
<td>Premium a la Carte</td>
<td>1,398</td>
</tr>
<tr>
<td>Regular a la Carte</td>
<td>1,313</td>
</tr>
<tr>
<td>Lite a la Carte</td>
<td>1,240</td>
</tr>
<tr>
<td>Open Kitchen Plans: for residents of American Studies and Yost</td>
<td></td>
</tr>
<tr>
<td>19 meals/week</td>
<td>1,398</td>
</tr>
<tr>
<td>14 meals/week</td>
<td>1,313</td>
</tr>
<tr>
<td>12 meals/week plus points</td>
<td>1,398</td>
</tr>
</tbody>
</table>

* All rates are approximate and subject to change.
† An administrative fee is withheld from the a la carte dollars given to spend. A la carte “points” and “plus points” do not carry over from previous quarters.

Cardinal Dollars may be purchased through University Dining Services by non-meal plan members and meal plan members who wish to supplement their meals. Cardinal Dollars may be used at any University Dining Services facility for regular meals, afternoon service, and late night pizza. Cardinal Dollars carry over until the end of the academic year and are not refundable. The minimum buy-in is $10.00.

All University Dining Services locations also accept the Stanford Card Plan which is available through the Bursar’s Office, Old Union, First Floor.

PAYMENTS

All charges and credits from offices within the University are aggregated in a student’s individual account and presented on the University Bill. The bill may include tuition, housing, food service, ASSU fees (special student-approved association fees set by the ASSU Senate), health insurance, and any miscellaneous charges incurred such as music lessons, cleaning or re-key charges. All amounts are due and payable upon receipt of the University Bill, but term-based charges (that is, tuition, room and board, ASSU, and health insurance fees) are always due by the day before term classes begin, whether or not a correct bill has been received. If term-based charges are added after the start of the term, they must be paid within 24 hours of the add date to avoid late fees. A miscellaneous charge will be subject to late fees 30 days after the first bill for it has been issued.

A Student Account (and its associated University Bill) may be paid with personal check (drawn on U.S. banks in U.S. funds), cash, scholarships, loan proceeds (for example, Perkins, Stafford, or University-issued), or proceeds of loans to parents (for example, CLAS, PLUS). Payments must be made in a form acceptable to the University. Shortfalls from any of the above categories may be made up in whole or in part from the University’s Deferment Loan Program (described below) for matriculated students. The University does not accept credit card payments.

LATE PAYMENT

All charges recorded in a Student Account must be paid by 5 p.m. on the day preceding the first day of instruction whether or not a bill has been received. Payment made on a Student Account after that date is subject to an additional charge in accord with the following fee schedule:

- $25 if payment is made on or after the first day of instruction, but during the first week of the term
- $40 if payment is made during the second week of the term
- $55 if payment is made during the third week of the term
- $75 if payment is made during the fourth week of the term
- $100 if payment is made during the fifth week of the term
- $125 if payment is made during the sixth week of the term or later

DEFERMENT LOAN PROGRAM

Deferment Loans (also known as “deferments”) are short-term loans and are available to matriculated students at the beginning of each term. The proceeds from a Deferment Loan may only be used to pay current term fees. The Deferment Loan may be used to avoid the application of Late Payment Fees described above. The terms of the Deferment Loan are:

1. $20 Deferment Loan Application Fee.
2. An annual interest rate of 10 percent assessed on the Deferment Loan principal until the date payment is received or until the due date, whichever comes first, in accord with the following schedule:

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Deferment Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autumn</td>
<td>November 7, 1997</td>
</tr>
<tr>
<td>Winter</td>
<td>February 19, 1998</td>
</tr>
<tr>
<td>Spring</td>
<td>May 14, 1998</td>
</tr>
<tr>
<td>Summer</td>
<td>July 22, 1998</td>
</tr>
</tbody>
</table>
3. Any portion of the amount of the loan may be prepaid before the due date without prepayment penalty.

4. Amounts remaining unpaid after the due date are delinquent and subject to a late charge of $25.00, and additional interest at the maximum rate permitted by California law (including California financial code §28000), or such lesser rate as the University may determine, in its sole discretion, from the due date until paid.

DELINQUENT ACCOUNTS

Delinquent accounts (such as for tuition, fees, housing, meal plans, or for other amounts owed to the University) are reported to the Registrar’s Office, which places a “hold” on the student’s further registration and on the release of transcripts and diplomas until the past-due accounts have been paid. In addition, delinquent accounts may be reported to one or more national credit bureaus and/or commercial collection agencies.

REFUNDS

Tuition, fees, and room and board payments for the term are not refundable, except to the extent provided below.

TUITION

Students who withdraw from the University before the end of a term may receive refunds of portions of their tuition as described below.

ANNULLED REGISTRATION

Students who withdraw from the University voluntarily on or before the second day of instruction may have their registrations annulled. Tuition is refunded in full. Such students are not included in University records as having registered for the term and new students will not secure any privileges for admission for any subsequent quarter as returning students. An annulment does not automatically cancel health coverage unless the annulment is granted by the second day of the term. Financial aid recipients should be aware that a proportion of any refund is returned to the various sources of aid.

CANCELLATION OF REGISTRATION FOR CAUSE

Students who have their registrations canceled or are suspended from the University for cause receive refunds on the same basis as those receiving leaves of absence unless otherwise specified in the disciplinary action taken. A student whose registration is canceled less than one week after the first day of instruction for an offense committed during a preceding quarter receives a full refund of tuition fees.

LEAVE OF ABSENCE

A student in good standing who wishes to withdraw from the University voluntarily, after the second day of instruction, but before the end of the fourth (sixth if Law) week of the term, may file a petition for a leave of absence in the Registrar’s Office.

Students granted a leave of absence for Autumn, Winter, or Spring term are refunded the tuition paid less the appropriate amount below, in accordance with the effective date of the leave and their original tuition charge.

REFUND SCHEDULE

Within first two weeks of instruction (quarter or semester):

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular</td>
<td></td>
</tr>
<tr>
<td>Basis</td>
<td>$1,540 1,635 1,880 1,720 1,825 1,825</td>
</tr>
<tr>
<td>7-10 Unit</td>
<td>Basis 915 965 1,095 1,010 1,110 1,110</td>
</tr>
<tr>
<td>3-6 Unit</td>
<td>Basis 555 580 645 605 705 705</td>
</tr>
<tr>
<td></td>
<td>Within third or fourth week of instruction (quarter or semester):</td>
</tr>
<tr>
<td></td>
<td>Regular (full-tuition)</td>
</tr>
<tr>
<td>Basis</td>
<td>2,880 3,070 3,560 3,240 3,365 3,365</td>
</tr>
<tr>
<td>7-10 Unit</td>
<td>Basis 1,630 1,730 1,990 1,820 1,935 1,935</td>
</tr>
<tr>
<td>3-6 Unit</td>
<td>Basis 915 965 1,095 1,010 1,115 1,115</td>
</tr>
<tr>
<td></td>
<td>Within fifth or sixth week of instruction (semester only):</td>
</tr>
<tr>
<td></td>
<td>Regular (full-tuition)</td>
</tr>
<tr>
<td>Basis</td>
<td>4,895 4,895</td>
</tr>
<tr>
<td>7-10 Unit</td>
<td>Basis 2,750 2,750</td>
</tr>
<tr>
<td>3-6 Unit</td>
<td>Basis 1,525 1,525</td>
</tr>
</tbody>
</table>

A student in the first quarter of matriculated enrollment is subject to a slightly different refund schedule and should consult with the Registrar’s Office for details. Leaves of absence effective after the fourth (sixth for Law) week of the term are only granted for approved health and emergency reasons and no tuition refund is allowed.

Tuition refunds for students withdrawing from the Summer Quarter follow a different schedule. Students should consult the bulletin Summer Session Catalogue, 1998 or the Registrar’s Office for more details.

Students granted leaves of absence are shown in the University records as having registered for the term and as having taken a leave of absence. No course work is shown on the record. Undergraduates in good standing may enroll in the University for a subsequent quarter with the privileges of a returning student. Graduate students
are subject to special registration requirements (see Leave of Absence in the “Graduate Degrees” section of this bulletin). Financial aid recipients should be aware that a proportion of any refund is returned to the various sources of aid. A leave of absence does not cancel a student’s health insurance coverage for the current term.

INSTITUTIONAL INTERRUPTION OF INSTRUCTION

It is the University’s intention to do everything possible to avoid taking the actions described in this paragraph. However, should the University determine that continuation of some or all academic and other campus activities is impracticable, or that their continuation involves a high degree of physical danger to persons or property, activities may be curtailed and students requested or required to leave the campus. In such an event, arrangements will be made as soon as possible to offer students the opportunity to complete their courses, or substantially equivalent work, so that appropriate credit may be given. Alternatively, the University may determine that students will receive refunds on the same basis as those receiving leaves of absence, or on some other appropriate basis.

ROOM AND MEAL PLAN REFUNDS

Students assigned to a University residence are subject to the conditions of the University Residence Agreement. Under this agreement, single students and couples without children are required to live somewhere in the University residence system for the entire academic year. Students with children may give notice of termination of occupancy for the end of each academic term. Room refunds are made only when students move out of the residence system and withdraw from the University. Students in all-male fraternities are billed directly by the fraternity, and refunds are arranged between the student and the fraternity.

A meal plan refund is based on the date when a student moves out of his or her University residence. If a student uses his or her meal plan after that date, he or she will incur an additional daily charge.

Any decision to refund prepaid room and meal plan charges or to waive liability for deferred charges shall ultimately be made at the sole discretion of the University. Students with questions about refunds should contact Housing Assignment Services (for room refunds) or the central office of University Dining Services (for meal plan refunds).

HOUSING

University housing is available to registered Stanford students. Planning of educational programs, counseling and crisis intervention by residence deans, and administration of residence offices is coordinated by the Department of Residential Education and Graduate Residences (http://rescomp.stanford.edu/resed.html). University housing assignments, community housing services, custodial services and maintenance, and dining services are provided by the Department of Housing and Dining Services (http://www-Ieland.stanford.edu/dept/hds/). Information on housing assignments may be obtained from Housing Assignment Services, Old Union, Stanford University, Stanford, CA 94305-3012 or telephone (650) 725-2810.

UNDERGRADUATE STUDENT RESIDENCES

RESIDENTIAL EDUCATION PROGRAM

The program in Residential Education provides for undergraduates certain dimensions of a college experience within a large research university. The essential conviction behind the Stanford residence program is that formal teaching, informal learning, and personal support in residences play an important role in a Stanford education. Residential Education programs extend the classroom into the residences and complement the academic curriculum with activities and experiences that contribute to students’ preparation for a life of leadership, intellectual engagement, citizenship, and service.

ASSIGNMENT TO UNDERGRADUATE RESIDENCES

Approximately 92 percent of undergraduates live in University housing. All freshmen are required to live in University residences for educational reasons and are automatically assigned housing following admission. Residence assignments for continuing undergraduates are made on the basis of an annual lottery (called the Draw) and quarterly waiting lists. Undergraduates who enter Stanford as freshmen are guaranteed four years of University housing if they are willing to live anywhere on campus. Transfer students are guaranteed two or three years of housing, based on their entering class standing.

Undergraduate residences include traditional dormitories, academic theme and focus houses, ethnic theme houses, student-managed and cooperative houses, apartments, suites, and fraternities.
GRADUATE STUDENT RESIDENCES
RESIDENCE PROGRAM

The University's philosophy of graduate student housing is based on the premise that supporting high quality graduate scholarship and research is central to the mission of the University. By providing affordable housing in proximity to academic resources, the University creates an environment conducive to research and intellectual dialogue among students, their peers, and faculty members.

ASSIGNMENT TO GRADUATE RESIDENCES

Approximately 45 percent of matriculated graduate students at the home campus live in University housing. Residence assignments are made on the basis of an annual lottery and quarterly waiting lists. New matriculated single students and couples without children who apply for housing by the May deadline and are willing to live in any residence for which they are eligible are guaranteed housing their first year at Stanford. New matriculated students with children who apply by the May deadline are assured four years of on-campus housing while registered.

Single graduate students may request assignment to graduate apartments and dormitories, or to spaces in six undergraduate cooperative houses. One-, two-, three-, and four-bedroom apartments are provided for couples without children and students with children, both graduate and undergraduate, based on student status and the number of dependents. Couple housing is available to students who are married and to students who have a same-sex or opposite-sex domestic partner. At Stanford University, a domestic partnership is defined as an established, long-term partnership with an exclusive mutual commitment in which the partners share the necessities of life and ongoing responsibility for their common welfare. Housing for students with children is available to married couples, domestic partners, and single parents who have dependent children living with them. Housing is not provided for extended families, including the parents and siblings of students.

COMMUNITY HOUSING

Community Housing Services maintains computerized listings of private rooms, houses, and apartments in surrounding communities that are available to students desiring to live off campus. Students must make rental arrangements directly with landlords. Information and publications on community housing may be obtained from Community Housing Services, Old Union, Stanford University, Stanford, CA 94305-3012 or telephone (650) 723-3906. During early September, temporary accommodations are available in a student dormitory at a modest charge for students searching for off-campus housing for Autumn Quarter. Contact Summer Conference Services for more information at (650) 725-1429.

RESIDENCE DEANS

Residence Deans provide assistance to on- and off-campus students. They can advise students about academic and personal matters, occasionally intervene directly in behavioral problems, and assist with personal emergencies. Advice is also available on issues of academic probation or suspension, leaves of absence, special concerns of women or minorities, and administrative matters. Residence Deans work closely with the Dean of Students and other University offices. Residence Deans are assigned to specific residences and to off-campus students; for further information, call Residential Education.
Stanford awards degrees four times each year, after the conclusion of Autumn, Winter, Spring and Summer Quarters. All diplomas, however, are distributed during Commencement exercises following Spring Quarter.

Students are required to apply in advance for conferral of their degrees; deadlines are listed in the Time Schedule. Students who fail to meet graduation requirements after having applied to graduate must reapply for degree conferral in a subsequent term.

Stanford University awards no honorary degrees.

DEGREES

BACHELOR OF ARTS (A.B.)
BACHELOR OF SCIENCE (B.S.)

Stanford University confers the degree of Bachelor of Arts (A.B.) or the degree of Bachelor of Science (B.S.) on those candidates who have been recommended by the Committee on Academic Appraisal and Achievement (C-AAA), who have applied in advance for conferral of the degree, and who have fulfilled the following requirements:

1. A minimum of 180 units of allowable University work. (As described below, units above the allowable limits for activity courses and for courses taken on a satisfactory/no credit basis cannot be counted towards the 180 minimum.)
2. The Writing, General Education, and Language Requirements (see below).
3. Curricular requirements of at least one major department or program and the recommendation of the department(s). (Descriptions of curricular and special degree requirements are included in each department's section of this bulletin.)
4. Minimum of 45 units (including the last 15) at Stanford. In special cases, as described above, students may petition for waiver of the last 15 units-in-residence requirement.
5. Minimum of three quarters of study in residence.

Stanford confers the Bachelor of Science degree on candidates who fulfill these requirements in the School of Earth Sciences, in the School of Engineering, or in the departments of Applied Physics, Biological Sciences, Chemistry, Mathematics, or Physics in the School of Humanities and Sciences. The University also awards B.S. degrees to candidates in the Program in Science, Technology, and Society; in the Program in Mathematical and Computational Science; in the Program in Symbolic Systems; and, when appropriate, in the Program for Individually Designed Majors. Candidates who fulfill these requirements in other schools or departments receive the Bachelor of Arts degree.

Students who complete the requirements for two or more majors which ordinarily would lead to the same degree (A.B. or B.S.) should review "The Major" section of this bulletin to ensure that they have an understanding of the requirements for multiple or secondary majors.

BACHELOR OF ARTS AND SCIENCE (B.A.S.)

The University confers the degree of Bachelor of Arts and Science (B.A.S.) on candidates who have completed, with no overlapping courses, the curricular requirements of two majors which ordinarily would lead to different bachelor's degrees (that is, a Bachelor of Arts degree and a Bachelor of Science). These students must have applied in advance for graduation with the B.A.S. degree instead of the A.B. or B.S. degree, been recommended by the C-AAA, and have fulfilled requirements 1, 2, 4 and 5 above in addition to the requirements for multiple majors.

Students who cannot meet the requirements for both majors without overlapping courses are not eligible for the B.A.S., but may apply to have a secondary major recorded on their transcripts. (See "The Major" section below.)

DUAL BACHELOR'S DEGREES (CONCURRENT A.B. AND B.S.)

A Stanford undergraduate may work concurrently toward both an A.B. and a B.S. degree. To qualify for both degrees, a student must complete:

1. A minimum of 225 units of University work. (As described below, units above the allowable limits for activity courses and for courses taken on a satisfactory/no credit basis cannot be counted towards the 225 minimum.)
3. The curricular requirements of two majors (one of which leads to a Bachelor of Arts degree and the other to a Bachelor of Science degree).
4. A minimum of 45 units (including the last 15) at Stanford. In special cases, as described above, students may petition for waiver of the last 15 units-in-residence requirement.
A minimum of three full-tuition quarters at Stanford after completion of 180 units (including Advanced Placement and transfer units), or of 15 full-tuition quarters of registration. Students must be registered at the regular full-tuition rate for the quarter to count as a full-tuition quarter. Up to six full-tuition quarters at another institution may be applied to the 15-quarter requirement, if the units have been accepted as transfer units on the Stanford transcript.

A student interested in dual bachelor's degrees should file a statement of intention with the Registrar's Office no later than two quarters in advance of completing the program. The statement should be submitted on a standard petition form along with recommendations of appropriate representatives from the two departments whose major requirements the student is expecting to fulfill.

Students who do not meet the higher unit and residence requirements of the dual degree option may be eligible instead for the B.A.S. degree as described above.

SECOND BACHELOR'S DEGREE

Stanford does not award a second Bachelor of Arts degree to an individual who already holds a Bachelor of Arts, nor a Bachelor of Science degree to an individual who already holds a Bachelor of Science degree. However, the holder of a Bachelor of Arts degree from Stanford may apply to the Subcommittee for Exceptions to Academic Policy for admission to candidacy for a Bachelor of Science degree, and the holder of a Bachelor of Science degree from Stanford may apply for candidacy for a Bachelor of Arts degree. A recommendation of the major department for the second bachelor's degree must accompany the application.

Generally, a student may not apply for a second bachelor's degree after having been a graduate student, although a student may submit a petition for exception. The Office of the Registrar's Academic Standing section in the Old Union, room 100, reviews these petitions. A student approved for this program may register as an undergraduate and is subject to the usual rules and regulations affecting undergraduates. Requirements for a second Stanford bachelor's degree are the same as those described above for dual bachelor's degrees.

COTERMINAL BACHELOR'S AND MASTER'S DEGREES

The coterminal degree program allows undergraduates to study for a master's degree while completing their bachelor's degree(s) in the same or a different department. Undergraduates with strong academic records may apply for admission to a coterminal master's program as early as the eighth quarter (or upon completion of 105 units) but no later than early in the eleventh quarter of undergraduate study, and at least four quarters in advance of the anticipated date of conferral of the master's degree. Students who wish to apply for a master's program after these deadlines must apply through the regular graduate admissions process.

To apply for admission to a coterminal master's program, students must submit to the prospective graduate department the following: coterminal application, statement of purpose, preliminary program proposal, two letters of recommendation from Stanford professors, and a current Stanford transcript. Graduate Record Examination (GRE) scores or other requirements may be specified by the prospective department.

The requirements for a coterminal bachelor's/master's program are (1) 180 units for the bachelor's degree plus 36 (or higher departmental requirement) unduplicated units for the master's degree and (2) fifteen full-tuition quarters or three full-tuition quarters beyond the quarter in which 180 units are completed. The requirements for the coterminal program with dual undergraduate degrees are 180 units for the first bachelor's degree, 45 units for the second bachelor's degree, 36 to 45 units for the master's degree, and six full-tuition quarters beyond the quarter in which 180 units are completed, or a total of 18 full-tuition quarters.

Of the 36-unit University minimum for the master's degree, all courses must be at or above the 100 level and 50 percent must be courses designated primarily for graduate students (typically at least at the 200 level). Department requirements may be higher. Units for a given course may not be counted to meet the requirements of more than one degree, that is, no units may be double-counted. No courses taken more than two quarters prior to admission to the coterminal master's program may be used to meet the 36-unit University minimum requirement for the master's degree.

For coterminal students, the quarter following completion of 180 units (or 225 units for dual undergraduate degree students) is identified as the first graduate quarter. Beginning with this quarter, coterminal students are subject to graduate student policies and procedures, as described in the "Graduate Degrees" section of this bulletin. These policies include continuous registration or leave of absence for quarters not enrolled (rather than the stopping out procedure for undergraduates) and minimal progress guidelines.

In the first graduate quarter, a coterminal student is assigned an adviser in the master's department to assist him or her in planning a program of study to meet the requirements for the master's degree. The plan is outlined on the Program Proposal for a Master's Degree, which is approved
by the master's department by the end of the first
graduate quarter. Authorizations for master's
programs expire three calendar years from the first
graduate quarter. An extension requires review of
academic performance by the department.
Conferral of each degree is applied for sepa-
rately by the deadlines given in the University Time
Schedule. The master's degree must be conferred
simultaneously with, or after, the bachelor's de-
gree.

DEGREE
REQUISITES

A LIBERAL EDUCATION

As do all major universities, Stanford provides
the means for its undergraduates to acquire a liberal
education—an education that broadens the stu-
dent's knowledge and awareness in each of the
major areas of human knowledge, that significant-
ly deepens understanding of one or two of these
areas, and that prepares him or her for a lifetime
of continual learning and application of knowl-
edge to career and personal life.

The undergraduate curriculum at Stanford al-
 lows considerable flexibility. It permits each stu-
dent to plan an individual program of study that
takes into account personal educational goals
consistent with particular interests, prior experi-
ence, and future aims. All programs of study
should achieve some balance between depth of
knowledge acquired in specialization and breadth
of knowledge acquired through exploration. Guid-
ance as to the limits within which that balance
ought to be struck is provided by the University's
General Education Requirements and by the re-
quirements set for major fields of study.

These educational goals are achieved through
study in individual courses that bring together
groups of students examining a topic or subject
under the supervision of scholars. Courses are
assigned credit units. To earn a bachelor's degree,
the student must complete at least 180 allowable
units and, in so doing, also complete the Writing
Requirement, the General Education Require-
ments, the Language Requirement, and the re-
quirements of a major.

The purpose of the Writing Requirement is to
promote effective communication by ensuring that
every undergraduate can write clear and effective
English prose. Words are the vehicles for thought,
and clear thinking requires facility in writing and
speech.

The Language Requirement ensures that every
student gains a basic familiarity with a foreign
language. Foreign language study extends the
student's range of knowledge and expression in
significant ways, providing access to materials and
cultures that otherwise would be out of reach.

The General Education Requirements provide
guidance toward the attainment of breadth and
stipulate that a significant share of a student's work
must lie outside an area of specialization. These
requirements ensure that every student is exposed
to different ideas and different ways of thinking.
They enable the student to approach and to under-
stand the important "ways of knowing"—to as-
 sess their strengths and limitations, their unique-
ness, and, no less important, what they have in
common with others.

Depth, the intensive study of one subject or area,
is provided through specialization in a major field.
The major relates more specifically to a student's
personal goals and interests than do the general
requirements outlined above. Stanford's curric-
ulum provides a wide range of standard majors
through its discipline-oriented departments, a
number of interdisciplinary majors in addition to
department offerings, and the opportunity for
students to design their own major programs.

Elective courses, which are not taken to satisfy
requirements, play a special role in tailoring the
student's program to individual needs. For
most students, such courses form a large portion
of the work offered for a degree. Within the lim-
itations of requirements, students may freely
choose any course for which previous studies have
prepared them.

Following are more detailed descriptions of
these various requirements and the rationales upon
which they are based.

THE WRITING REQUIREMENT

All instructors expect that students will express
themselves effectively in speech and writing. The
Writing Requirement helps students meet that
expectation.

All candidates for the bachelor's degree, regard-
less of the date of matriculation, must satisfy the
requirement. Transfer students are individually
informed at matriculation of their status with
regard to the requirement.

The Writing Requirement was revised for un-
dergraduates who entered Stanford in Autumn
1996 and thereafter. In addition to the requirement
detailed below for completion of the first-year
courses, these students must complete a writing-
 intensive course within each of their majors.
Courses available to fulfill the Writing in the Major
Requirement (WIM) are designated under indi-
vidual department listings.

All undergraduates must satisfy the first-year
course(s) requirement in one of four ways:
1. English 1-2, a two-quarter sequence of com-
position courses. (Note: a few students who
demonstrate sufficient skill in the first quarter
of the English 1-2 sequence will be exempted
from English 2 upon certification by the instruc-
tor.)
2. English 3, an intensified one-quarter course open only to students with a score of 4 or 5 on the CEEB Advanced Placement Test in English.
3. Special writing instruction in connection with the Area One Requirement.
4. Approved transfer credit.

A complete list of courses is distributed to all entering undergraduates and is also available at the Writing and Critical Thinking office.

Courses available to fulfill the first-year Writing Requirement are designated (W) in this bulletin.

THE GENERAL EDUCATION REQUIREMENTS

PURPOSE

The General Education Requirements are an integral part of undergraduate education at Stanford. Their purpose is two-fold: to introduce students to a broad range of fields and areas of study within the humanities, social sciences, natural sciences, applied sciences, and technology, and to help students prepare to become responsible members of society. Whereas the concentration of courses in the major is expected to provide depth, the General Education Requirements have the complementary purpose of providing breadth to a student's undergraduate program. The requirements are also intended to introduce students to the major social, historical, cultural, and intellectual forces that shape the contemporary world.

Fulfillment of the General Education Requirements in itself does not provide a student with a sufficiently broad education any more than acquiring the necessary number of units in the major qualifies the student as a specialist in the field. The major and the General Education Requirements are meant to serve as the nucleus around which the student is expected to build a coherent course of study by drawing on the options available among the required and elective courses.

Information regarding specific courses that have been certified to fulfill the General Education Requirements and regarding a student's status in meeting these requirements is available at the Office of the Registrar. Course planning and advising questions related to the General Education Requirements should be directed to the Undergraduate Advising Center.

It is the responsibility of each student to ensure that he or she has fulfilled the requirements by checking in Axess within the Undergraduate Progress function or by checking with the Office of the Registrar. This should be done at least two quarters before graduation.

Students should be extremely careful to note which set of General Education Requirements apply to them. The date of matriculation at Stanford determines which requirements apply to an individual student.

CURRENT SYSTEM

To fulfill the General Education Requirements (GER), undergraduates who entered Stanford in Autumn Quarter 1996 and thereafter must complete a minimum of nine courses certified for this purpose in four areas as follows:

Area 1 Program—Students can fulfill this requirement in two different ways:
1) Cultures, Ideas, and Values tracks (three-quarter course sequences) or
2) Introduction to the Humanities courses (one-quarter introductory courses followed by two-quarter thematic sequences)

Students are expected to satisfy the Area One Requirement during their freshman year.

Area 2: Natural Sciences, Applied Science and Technology, and Mathematics—Students can fulfill this requirement in two different ways:
1) by completing one of the integrated three-course Science, Mathematics, and Engineering Core sequences or
2) by completing three certified GER courses in this area, with no more than two of these courses from the same subarea.

Area 3: Humanities and Social Sciences—Students are required to complete three certified GER courses in this area with at least one course in the humanities subarea and one in the social sciences subarea.

Area 4: World Cultures, American Cultures, and Gender Studies—While satisfying requirements for areas 1 or 3, or by taking additional courses, students must complete at least one certified GER course in two of the three subareas.

Courses certified as meeting the General Education Requirements must be taken for a letter grade and a minimum of 3 units of credit. A single course may be certified as fulfilling only one subarea within the General Education Requirements; the one exception is that a course may be certified to fulfill an Area 4 subarea in addition to an Area 3 subarea.

Courses that have been certified as meeting the requirements are identified throughout this bulletin with the notational symbols listed below. A comprehensive list of certified courses also appears as an Appendix to this bulletin.

Area 1 Program
GER 1a: first-quarter course
GER 1b: second-quarter course
GER 1c: third-quarter course

Area 2: Natural Sciences, Applied Science and Technology, and Mathematics
GER 2: three-quarter Science, Mathematics, and Engineering core sequence or
GER 2a: Natural Sciences subarea
GER 2b: Applied Science and Technology
GER 2b: Applied Science and Technology subarea
GER 2c: Mathematics subarea
Area 3: Humanities and Social Sciences
GER 3a: Humanities subarea
GER 3b: Social Sciences subarea
Area 4: World Cultures, American Cultures, and Gender Studies
GER 4a: World Cultures subarea
GER 4b: American Cultures subarea
GER 4c: Gender Studies subarea

Continuing undergraduates who entered Stanford prior to Autumn 1996 may elect to complete either the set of Distribution Requirements in effect when they entered or the set of General Education Requirements effective Autumn 1996 and described above. Note: students will not, however, be permitted to mix the requirements of the two systems or to change from one system to the other after they have elected the system under which they wish to be monitored for graduation. If the 1996 program of General Education Requirements is chosen, only certified courses passed with a letter grade and taken for 3 or more units can fulfill the requirements.

CREDIT TRANSFER

While courses taken in fulfillment of the General Education Requirements should be taught by Stanford faculty members who are Academic Council members or Senior Lecturers, students may propose that work taken at another college or university be accepted in fulfillment of a General Education Requirement. In such cases, the Office of the Registrar’s Credit Evaluation staff determines, after appropriate faculty consultation, whether the work is comparable to any of the specifically certified courses or course sequences.

UNDERGRADUATES WHO ENTERED PRIOR TO AUTUMN 1996

Stanford has a long tradition of ensuring curricular breadth through some system of requirements, variously described as “distribution requirements,” “general studies requirements,” or “general education requirements.” A student returning to Stanford to complete an interrupted degree program may satisfy either the distribution program in place at the time of matriculation or the current program of requirements. Such a student should consult the Stanford Bulletin or its predecessors appropriate to the original entrance year or seek the advice of the Undergraduate Degree Coordinator, room 131, Old Union. Students completing requirements in effect 1991 or later may find the Appendix to this bulletin helpful in providing them with a list of certified courses. This list indicates which courses fulfill the Distribution Requirements in effect in 1991, as well as the General Education Requirements in effect beginning Autumn 1996.

THE LANGUAGE REQUIREMENT

To fulfill the Language Requirement, undergraduates who entered Stanford in Autumn Quarter 1996 and thereafter are required to complete one year of college-level study in a foreign language, or the equivalent. Students can fulfill the requirement in any of the following ways:

1. Complete three quarters of a first-year language course at Stanford or the equivalent at another recognized post-secondary institution.
2. Score a 4 or 5 on the CEEB Advanced Placement test in a language other than English.
3. Score the equivalent of a 600 or better on the SAT II Subject Tests in a language other than English.
4. Take a diagnostic test in a particular language which either:
   a) places them out of the requirement, or
   b) diagnoses them as needing one, two, or three additional quarters of college-level study. In this case, the requirement can then be fulfilled either by passing the required number of quarters of college-level language study at Stanford or the equivalent elsewhere, or by retaking the diagnostic test at a later date and placing out of the requirement.

CREDIT ADVANCED PLACEMENT

Stanford University allows up to 45 units of credit toward graduation for work completed in high school as part of the College Entrance Examination Board (CEEB) Advanced Placement curriculum. The awarding of such credit is based on CEEB Advanced Placement test scores and is subject to University and department approval. The faculty of a given department determine whether any credit toward the 180-unit requirement can be based on achievement in the CEEB Advanced Placement Program in their discipline. Stanford departments electing to accept the Advanced Placement (AP) credit are bound by these University policies:

1. Credit is usually granted for an AP score of 4 or 5. Usually, 10 quarter units are awarded (but occasionally fewer than 10). No more than 10 quarter units may be given for performance in a single examination. If the student has scores of 4 or 5 on two or more exams within the same subject (for example, Music Theory and Music History), the student is given a maximum total of 10 quarter units based on only one of the scores—the higher of the two, if different. The Studio Art and Art History examinations are treated separately and yield 10 quarter units each for scores of 4 or 5.
2. Whether credit is to be given for an AP score of 3 is a matter for departmental discretion; up to 10 units may be awarded.
3. No credit may be authorized for an AP score lower than 3.

Performance on an AP exam can indicate the appropriate placement for continuing course work in that subject at Stanford. Students may not enroll in courses at Stanford for which they received equivalent credit through the AP program. The chart below shows the current AP credit and placement policies. Further information is available from the Office of the Registrar's Transfer Credit Evaluator, room 100, Old Union.

<table>
<thead>
<tr>
<th>Test Subject</th>
<th>Score</th>
<th>Placement</th>
<th>Quarter Units of Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Government and Politics</td>
<td>4, 5</td>
<td>Not applicable</td>
<td>5</td>
</tr>
<tr>
<td>U.S. History</td>
<td>4, 5</td>
<td>Not applicable</td>
<td>10</td>
</tr>
<tr>
<td>Art History</td>
<td>4, 5</td>
<td>Not applicable</td>
<td>10</td>
</tr>
<tr>
<td>Art (Studio)</td>
<td>4, 5</td>
<td>Not applicable</td>
<td>10</td>
</tr>
<tr>
<td>Biology</td>
<td>4, 5</td>
<td>Not applicable</td>
<td>10</td>
</tr>
<tr>
<td>Chemistry</td>
<td>4, 5</td>
<td>Chem. 32 or above</td>
<td>4</td>
</tr>
<tr>
<td>Comparative Government and Politics</td>
<td>4, 5</td>
<td>Not applicable</td>
<td>5</td>
</tr>
<tr>
<td>Computer Science AB</td>
<td>5</td>
<td>CS106X*</td>
<td>5</td>
</tr>
<tr>
<td>Computer Science A</td>
<td>4, 5</td>
<td>CS106X</td>
<td>5</td>
</tr>
<tr>
<td>Macro/Micro Economics</td>
<td>≥8</td>
<td>Econ. 51†</td>
<td>5</td>
</tr>
<tr>
<td>English</td>
<td>4, 5</td>
<td>English 3</td>
<td>6</td>
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<tr>
<td>European History</td>
<td>4, 5</td>
<td>Not applicable</td>
<td>10</td>
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<tr>
<td>French</td>
<td>4, 5</td>
<td>Third year and above</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Take test for placement and</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>possible units</td>
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<tr>
<td>German</td>
<td>4, 5</td>
<td>Take oral placement test</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Take placement test</td>
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</tr>
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<td>Latin</td>
<td>4, 5</td>
<td>Take placement test</td>
<td>10</td>
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<tr>
<td></td>
<td>1, 2</td>
<td>Consult Classics Dept.</td>
<td></td>
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<tr>
<td>Math. AB</td>
<td>5</td>
<td>Math. 51</td>
<td>10</td>
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<td></td>
<td>4</td>
<td>Math. 42</td>
<td>5</td>
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<tr>
<td></td>
<td>1, 2, 3</td>
<td>Math. 19 or 41</td>
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</tr>
<tr>
<td>Math. BC</td>
<td>4, 5</td>
<td>Math. 51</td>
<td>10</td>
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<tr>
<td></td>
<td>3</td>
<td>Math. 42</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1, 2</td>
<td>Math. 19 or 41</td>
<td></td>
</tr>
<tr>
<td>Music</td>
<td>4, 5</td>
<td>Not Applicable</td>
<td>10</td>
</tr>
<tr>
<td>Physics B</td>
<td>4, 5</td>
<td>Based on AP Physics and Math. results</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Based on AP Physics and Math. results</td>
<td>8</td>
</tr>
<tr>
<td>Physics C (2 parts)</td>
<td>4, 5</td>
<td>Based on AP Physics and Math. results</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Based on AP Physics and Math. results</td>
<td>4</td>
</tr>
<tr>
<td>E&amp;M only</td>
<td>4, 5</td>
<td>Based on AP Physics and Math. results</td>
<td>5</td>
</tr>
</tbody>
</table>

** Based on AP Physics and Math. results

Based on AP Physics and Math. results

Psych. 2 or above

** Take placement test

Both 4, 5 Based on AP Physics and Math. result

Both 3 Based on AP Physics and Math. result

Psychology 4, 5

Spanish 4, 5

Take placement test

Statistics 4, 5

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* Students may skip Computer Science 106A, B and X and complete Computer Science 107 or 109A to receive an additional 5 quarter units.

† A minimum score of 4 on both tests will receive 5 units.

** Five quarter units if placed in Spanish 12 or above.

ACTIVITY COURSES

For undergraduates who entered Autumn 1996 and thereafter, a maximum of 8 units of credit earned in activity courses, regardless of offering department or if accepted as transfer units, count towards the 180 (225 if dual degrees are being pursued) units required for the bachelor's degree. All activity courses are offered on a satisfactory/no credit basis.

Undergraduates who entered Stanford between Autumn 1986 and the end of the 1995-96 academic year may apply a maximum of 12 units in activity courses (Physical Education or Music Activity) to the 180/225 unit requirement for graduation.

COURSES TAKEN ON SATISFACTORY/NO CREDIT OR CREDIT/NO CREDIT BASIS

For undergraduates who entered Autumn 1996 and thereafter, a maximum of 36 units of credit taken at Stanford or its overseas campuses for a "CR" or "S" grade may be applied towards the 180 (225 if dual degrees are being pursued) units required for the bachelor's degree. For those who entered Stanford as transfer students in Autumn 1996 and thereafter, the maximum is 27 units.

Departments may also limit the number of satisfactory or credit courses accepted towards the requirements for a major. Satisfactory/credit courses applied towards a minor may be similarly limited. Courses not letter-graded are not accepted in fulfillment of the General Education Requirements or Writing in the Major Requirement applicable to undergraduate students who entered Stanford in Autumn 1996 and thereafter.

INTERNSHIP GUIDELINES

Undergraduate internships should not by themselves carry any credit. However, an individual student may arrange with a faculty member for a research or other academic project to be based on the internship. Arrangements between students and faculty regarding credit are expected to be
made well in advance of the internship. Credit should be arranged within departmental rules for directed reading or independent study and should meet the usual department standards.

TRANSFER

Academic credit for work done elsewhere will be allowed toward a Stanford bachelor’s degree under the following rules and conditions:

1. Credit is officially allowed only after the student has been unconditionally admitted to Stanford.

2. Credit is allowed only on the basis of an official transcript received by the Registrar at Stanford directly from the institution where the credit was earned.

3. Credit from another institution will be transferred for courses that are substantially equivalent to those offered at Stanford University on the undergraduate level. A maximum of 6 quarter units may represent courses that do not parallel specific courses at Stanford, subject to the approval of the credit evaluator.

4. The credit allowed at Stanford for one quarter’s work elsewhere may not exceed the number of units that would have been permissible for one quarter if the work had been done at Stanford; for work done under a system other than the quarter system, the permissible maximum units are calculated at an appropriate ratio of equivalence.

5. Credit is allowed at Stanford for work graded ‘A,’ ‘B,’ ‘C,’ or ‘Satisfactory’ (a ‘Satisfactory’ must be verified as equivalent to a ‘C’ or higher), but not for work graded ‘D’ or below.

6. No more than 90 quarter units of credit for work done elsewhere may be counted toward a bachelor’s degree at Stanford.

7. Credit earned at a community college is transferable to Stanford under either, but not both, of the following sets of circumstances:

   a) The credit is part of the first 90 units on the student’s college record.

   b) The student has already completed 90 quarter units of work at Stanford not counting any credit elsewhere, and the community college credit involved is not part of the last 15 quarter units required for the bachelor’s degree at Stanford and does not exceed 15 quarter units.

8. Credit earned in extension and correspondence courses is transferable only if the university offering the courses allows that credit toward its own bachelor’s degree. Such credit is limited to a maximum of 45 quarter units for extension courses, a maximum of 15 quarter units for correspondence study, and a maximum of 45 quarter units for the combination of extension and correspondence courses.

9. Credit earned in military training and service is not transferable to Stanford, except at the discretion of the Registrar.

10. Credit earned in nonaccredited institutions in the United States is not transferable to Stanford, except at the discretion of the Registrar.

11. Study in institutions outside the United States, when validated by examination results, tutorial reports, or other official evidence of satisfactory work, is credited toward a Stanford bachelor’s degree at the discretion of the Registrar. All such study must be evaluated by the appropriate departments through Transfer Credit Evaluation, room 100, Old Union.

THE MAJOR

The primary purpose of the major is to encourage each student to explore a subject area in considerable depth. This in-depth study complements the breadth of study promoted by the General Education Requirements and, in many cases, by a student’s choice of electives. Work in depth permits practice in critical analysis and the solving of problems. Because of its depth, such study also provides a sense of how knowledge grows and is shaped by time and circumstances.

The structure of a major should be a coherent reflection of the logic of the discipline it represents. Ideally, the student should be introduced to the subject area through a course providing a general overview, and upper-division courses should build upon lower-division courses. The course of study should, if feasible, give the student the opportunity and responsibility of doing original, creative work in the major subject. Benefits of the major program are greatest when it includes a culminating and synthesizing experience such as a senior seminar, an undergraduate thesis, or a senior project.

REQUIREMENTS

Undergraduates must select a major by the time they achieve junior status (85 units completed). All undergraduate major programs listed in this bulletin, except for certain honors degree programs that require application and admission in advance, are open to all students. Students may change their majors at any time upon request; in some departments or programs, though, a late change could easily result in extending the period of undergraduate study.

Check individual department or program listings in this bulletin for the undergraduate degrees offered and for specific major requirements. If an area of study has no baccalaureate degree, that discipline is not available as a regular undergraduate major.

Faculty set the minimum requirements for the major in each department. These requirements usually allow latitude for tailoring a major pro-
program to a student’s specific educational goals. The responsibility for developing a major program within department or program requirements lies ultimately with the individual student working in consultation with the major adviser.

MULTIPLE MAJORS

Although most students declare only one major, a student may formally declare more than one major within a single bachelor’s degree (A.B., B.S., or B.A.S.) program. The student may do that either at the time of initial major declaration or, as may be more advisable given the planning required to complete more than one major, by amending the original declaration. The student’s major departments or programs will have access routinely to all information pertinent to that student’s academic record (for example, course and grade information), and each is expected to provide advising and other assistance. Students may pick up appropriate information regarding major declarations from the Registrar’s Office. To be awarded a bachelor’s degree with multiple majors, the student must fulfill the following requirements:

1. Formally declare all majors to the Registrar’s Office.
2. Satisfy the requirements of each major without applying any course towards the requirements of more than one major or any minor unless
   a) overlapping courses constitute introductory skill requirements (for example, introductory math or a foreign language)
   b) overlapping courses enable the student to meet school requirements (for example, for two majors within the School of Engineering). Currently, only the School of Engineering has school requirements for its undergraduate majors.

Students pursuing multiple majors must complete a multiple major program sheet indicating which courses they plan to apply toward each major and any minor(s). Departments must certify that the plan of study meets all requirements for the majors and any minor(s) without unallowable overlaps in course work. To facilitate advance planning, multiple majors program sheets are available at any time in the Degree Progress Office, room 131, Old Union.

When students cannot meet the requirements of multiple majors without overlaps, the secondary major, outlined below, may be relevant.

SECONDARY MAJOR

In some cases, students may complete course requirements for more than one major, but they may not meet the requirements outlined for the multiple major option. For example, the student may develop a course plan in which courses requisite for one major overlap with requirements for another. In these cases, the student may declare a secondary major which will result in the transcript bearing an annotation that the course requirements for that major have also been met.

LIMITS OF THE MAJOR

In order to achieve the values of study in depth, a well-structured major should constitute approximately one-third of a student’s program (55-65 units). To ensure the values of breadth, a major should comprise no more than two-thirds of a student’s program (115-125 units). And, to avoid intellectual parochialism, a major program should not require a student to take more than about one-third of his or her courses from within a single department.

Major requirements in cognate subjects essential to the structure of a given major should be counted as part of the major program in applying these guidelines. Department or school requirements designed to provide extra disciplinary breadth should not be counted.

For a limited number of qualified students, many departments and programs offer special programs leading to degrees with honors. After declaring a major, a student may apply to the major department or program for acceptance into the honors program. Demands on the student may vary, but all honors programs encourage creative, independent work at an advanced level in addition to the major requirements.

The guidelines set forth here are deliberately general; implementation must take into account the specific needs of a student’s program and the nature of the discipline or disciplines involved. The exercise of responsibility in achieving the desired educational balance belongs first with the student, who, after all, has the strongest interest in the value of his or her education. It belongs secondarily to departments and major programs, which must set the requirements of competence in the many majors offered.

PROGRAM FOR INDIVIDUALLY DESIGNED MAJORS

Individually Designed Majors (IDM) is coordinated by the Undergraduate Advising Center, located in Sweet Hall, 1st floor.

This program is intended for currently registered undergraduates in good academic standing interested in pursuing an area of scholarly inquiry that falls outside the purview of an established academic department or program of the University. Students submit proposals for consideration by the IDM Program Dean’s Advisory Committee. These should be intellectually coherent majors designed by the students themselves, with the assistance of faculty members of their choice. While the Individually Designed Major (IDM) program is not an honors program, the governing committee encourages each participating student
to consider an honors project as a culminating experience of the major. Information about proposal procedures, and the procedure for an honors project, is available at the Undergraduate Advising Center, Sweet Hall, first floor.

In designing a major, the student consults with three faculty members (at least two of whom must be members of the Academic Council) from at least two separate departments or programs of the University; one of the faculty members is selected as the student’s “primary” adviser. In helping the student design the major and in signing the proposal requesting approval from the Dean’s Advisory Committee on Individually Designed Majors, the faculty members are committing themselves to act as a regular academic advisory group for the student until graduation. The committee does not consider proposals without the approval of the faculty advisory group.

THE “COMMITTEE IN CHARGE”

The program is administered by the Dean’s Advisory Committee on Individually Designed Majors and the Undergraduate Advising Center. The committee acts in lieu of a regular department of the University. This role involves certifying the scholarly merit of the program and includes the obligation to consider, approve, and recommend changes in each proposed major.

In carrying out its role, the committee reserves the right to reject proposals that in its opinion lack scholarly merit or are not clearly interdisciplinary. Occasionally, the committee must reject a proposal that, though of considerable academic merit, requires resources not available at Stanford. The committee also reserves the right to recommend additions to a student’s faculty advisory group.

THE PROPOSAL

Detailed written procedures and advice about the preparation of the proposal are available from the Undergraduate Advising Center (Sweet Hall, first floor; telephone (650) 723-2426), where the Program Coordinator is available to discuss your proposal with you.

The proposal should begin with a statement that describes the major, articulates the motivation for and the justification and ultimate goal of the major, and shows how the courses listed relate to and fulfill the major’s goal. This statement should be followed by a list of the proposed core courses to be counted toward the major and, as far as possible, the sequence in which they are to be taken. The proposal must be signed by the selected faculty advisory group; their signatures certify that they endorse the major as described in the proposal and agree to serve as the student’s permanent advisory group. The proposal must be accompanied by a letter of recommendation from each of the three advisers giving separate appraisals of the academic viability of the proposed major. The proposal must also include a current copy of the student’s unofficial transcript. These specific requirements are in addition to the general guidelines discussed under “The Major” section of this bulletin.

THE GUIDELINES

To establish the IDM program as being fully equivalent to a Stanford A.B. or B.S. degree in an established department or program, the Senate of the Academic Council has approved specific requirements. The criteria for approval of proposals submitted include:

1. Each major shall consist of at least 60 units, all in courses at or above the 100 level (or their equivalent).
2. A maximum of 15 units of these 60 units may be taken on a Credit/No Credit basis.
3. A maximum of 8 units of these 60 units may be taken in individual study or directed reading.
4. The proposed major must constitute a coherent academic program that fulfills the student’s objectives and achieves a clear academic goal.
5. The proposed major must be comparable in quality and in academic rigor to degrees obtained by students in other degree-granting programs offered at Stanford.
6. The proposed major must achieve both breadth and depth within the academic discipline(s), involve interdisciplinary study, and be compatible with a liberal arts education.
7. The proposed major must not duplicate or be achievable through a major already offered by another degree-granting program or department.
8. Students must present evidence that demonstrates their ability to do independent work.
9. Students proposing individually designed majors must have at least three full quarters of undergraduate work remaining at Stanford after the date on which the proposal is approved by the committee.
10. Two of the three advisers must be on the Academic Council. No more than two advisers may be from the same department.

MINORS, HONORS, ACADEMIC STANDING, AND ADVISING

THE UNDERGRADUATE MINOR

Beginning in Autumn Quarter 1996, students completing a bachelor’s degree may elect to complete one or more minors in addition to the major. Minors must be officially declared by students
no later than the deadline for their applications to graduate, according to declaration procedures developed and monitored by the Registrar. Earlier deadlines for declaration of the minor may be set by the offering school or department. Satisfactory completion of declared minors is noted on the students’ transcripts after degree conferral.

A minor is a coherent program of study defined by the department or degree program. It may be a limited version of a major concentration or a specialized subset of a field. A minor consists of no fewer than six courses of 3 or more units to a maximum of 36 units of letter-graded work, except where letter grades are not offered. Departments and degree programs establish the structure and requirements of each minor in accordance with the policy above and within specific guidelines developed by the deans of schools. Programs which do not offer undergraduate degrees may also make proposals to their cognizant deans to establish a minor. Requirements for each minor are described in the individual department or program listings in this bulletin.

Students may not overlap (“double-count”) courses for completing major and minor requirements, unless:

1. Overlapping courses constitute introductory skill requirements (for example, introductory math or a foreign language), or
2. Overlapping courses enable the student to meet school requirements (for example, for a major within the School of Engineering and a minor). Currently, only the School of Engineering has school requirements for its undergraduate majors.

Students who wish to declare or drop a minor should see the Office of the Registrar Home Page located on the World Wide Web at http://www-uleland.stanford.edu/dept/registrar/.

Students with questions about declaring minors or double-counting courses towards combinations of majors and/or minors should consult with the departments or programs involved or the Registrar’s Degree Progress Office, room 131 of the Old Union.

BACCALAUREATE HONORS

With Distinction—In recognition of high scholastic attainment, the University, upon recommendation of a major department or program, awards the Bachelor’s Degree with Distinction to approximately 15 percent of the graduating class.

Students are also urged to consider the departmental honors programs that may give depth to their major study and to consider, as well, how the interdisciplinary honors programs might contribute to the quality of their undergraduate education.

Departmental Honors Programs—In recognition of successful completion of special advanced work, departments in more than 30 fields of study may recommend their students for honors. Departmental honors programs demand independent creative work at an advanced level in addition to the major requirements.

Interdisciplinary Honors Programs—In recognition of successful completion of honors program requirements, the following interdisciplinary programs can recommend students majoring in any field for honors in their program:

Education
Environmental Science, Technology, and Policy
Ethics in Society
Feminist Studies
Humanities
Jewish Studies
Latin American Studies
Science, Technology, and Society.

The interdisciplinary honors programs are designed to complement study in a department major. The requirements for these honors programs are described in the department sections of this bulletin.

Foreign Language Proficiency—The notation “proficiency in (language)” appears on the official transcripts of those students whose levels of achievement are found by procedures established by the language department to be roughly equivalent to knowledge an excellent student can be expected to demonstrate late in the third quarter of the third year of study in that language.

ACADEMIC STANDING

Undergraduate students normally are expected to plan their academic programs so that they can complete 180 units in four years (twelve quarters), including the requirements for a major and the General Education Requirements. Satisfactory academic progress is, on average, 45 units per academic year for four years leading to at least 180 units and a baccalaureate degree.

While undergraduate students are expected to register for a minimum of 12 units, they are required to complete at least 9 units each quarter and at least 36 units in their most recent three quarters of Stanford enrollment. Transfer work completed at other institutions is not considered in this calculation. A student earning fewer than 9 units per quarter or fewer than 36 units in three quarters is placed on probation. Students on probation or provisional registration status are required to earn a minimum of 12 units per quarter, by the end of the end-quarter examination period for three consecutive quarters, to attain good academic standing. A Stanford Summer Session Quarter count toward the three consecutive quarter requirement if 11 or more units are completed. The
faculty Subcommittee on Academic Standing may stipulate otherwise by acting upon a petition for fewer units.

Full-time enrollment is considered to be enrollment in a minimum of 12 units of course work per quarter at Stanford. Work necessary to complete units from previous quarters does not count toward the 12 units necessary for full-time enrollment in the current quarter. All undergraduate students validly registered at Stanford are considered to be in good standing for the purposes of enrollment certification and athletic participation.

Units are granted for courses completed with grades 'A,' 'B,' 'C,' 'D,' "Satisfactory" ("CR" or 'S'), and 'L.' Courses graded 'N' are counted provisionally as units completed, provided the student enrolls in the continuing segment of that course the following quarter. When the course is completed, the student receives the units for which he or she enrolled. No units are granted for a course in which the student receives an 'I' or an '*' until the course is completed satisfactorily and the final grade reported. (See "Grading Systems" above.)

PROBATION

A student who fails to complete at least 36 units of work in his or her most recent three quarters of enrollment at the University, or a student who fails to complete, by the end of the final examination period, at least 9 quarter units of work in his or her most recent quarter of enrollment at the University shall be placed on probation (warning status).

A student shall be removed from probation after three subsequent quarters of enrollment at the University if in each quarter he or she completes a minimum of 12 units of new course work by the end of the final examination period. A student may also be removed from probation at the discretion of the subcommittee as a result of a review of individual records.

PROVISIONAL REGISTRATION

A student who fails to complete a minimum of 12 units of new course work by the end of the final examination period in any quarter of registration while on provisional registration (and in some cases probation) shall be suspended. In general, students suspended for the first time are suspended for one year. Students suspended a subsequent time are suspended for three years.

Students suspended for one year are not eligible to enroll for four quarters (including Summer Quarter) following the quarter in which the suspension was issued. Students suspended for three years are not eligible to enroll for twelve quarters (including Summer Quarter) following the quarter in which the suspension was issued. Students are required to submit a properly endorsed petition for provisional registration to request reenrollment after the suspension period has been completed.

Return from Suspension—Students who have been suspended are required to petition for provisional registration to return after their suspension has been completed. Students are strongly encouraged to submit their petition at least two months prior to the desired quarter of return, but no later than the first week of the desired quarter of return.

Early Return from Suspension—Students who have been suspended and who believe they have a compelling reason to return early from their suspension are required to submit a petition for provisional registration. Students are strongly encouraged to submit their petition at least two months prior to the desired quarter of return, but no later than the first week of the desired quarter of return.

Appeal of Suspension—Students who have been suspended, and who believe they have a compelling reason to appeal their suspension are required to submit a petition for provisional registration.
Petitions are due no later than the first week of the desired quarter of return unless otherwise noted in the letter of suspension.

**Petitioning to Return from Suspension**—See prior sections on “Petitioning for Provisional Registration,” “Return from Suspension,” “Early Return from Suspension,” and “Appeal of Suspension.” Late petitions to return from suspension will not be considered.

**NOTIFICATION**

Written notification that a student is on probation, provisional registration, or suspension is sent to the student and to the student’s academic adviser as soon as possible after the close of the quarter. Students also receive written notification of the outcome of their provisional registration petition.

**UNDERGRADUATE ACADEMIC ADVISING**

The Undergraduate Advising Center (UAC) provides and coordinates services that help student and adviser work together toward the establishment and accomplishment of the student’s academic and personal goals.

Freshmen are assigned to general academic advisers according to their residence and their preliminary academic interest. Freshmen advisers work with advisees each quarter to plan their academic programs; advisers must provide an approval code for the on-line filing of study lists through Axess for each quarter of the students’ freshman year.

Sophomores who are undecided about their majors continue to work with the advisers they had as freshmen, and to seek out their advisers’ guidance and approval code. By the time they achieve junior status, undergraduates must declare a major, at which time they are assigned to an adviser from the faculty of the major department or program.

The UAC’s staff of professional advisers, located on the first floor of Sweet Hall, provides advising to all students (freshmen through seniors) on course selection, choosing a major, and planning for an academic career; graduate school and funding for graduate study; sophomore and transfer advising; individually designed majors; and preparing for business, law, medical school, or other allied health fields. Reference guides to graduate and professional schools are available. For detailed information see the UAC web site at http://uac-server.stanford.edu or request a copy of the UAC brochure.
GRADUATE DEGREES

GENERAL REQUIREMENTS

For each Stanford advanced degree, there is an approved course of study which meets University and department requirements. The University’s general requirements, applicable to all graduate degrees at Stanford, are described below. University requirements pertaining to only a subset of advanced degrees are described in the “Degree-Specific Requirements” section.

See the “Graduate Programs” section of each department’s listing for specific department degree requirements. Information on professional school programs is available in the bulletins of the Graduate School of Business, the School of Law, and the School of Medicine.

REGISTRATION REQUIREMENTS

Graduate students must register for all terms of each academic year (Autumn, Winter, and Spring Quarters or, for Law students, Autumn and Spring Semesters), from the admission term until conferral of the degree. The only exception to this requirement occurs when the student is granted an official leave of absence. Failure to register for a term during the academic year without taking a leave of absence results in denial of further registration until reinstatement to the degree program is granted and the reinstatement fee paid. Registration in Summer Quarter is not required and does not substitute for registration during the academic year.

In addition to the above requirement for continuous registration during the academic year, graduate students are required by the University to be registered:

1. In each term during which any official department or University requirement is fulfilled, including qualifying exams or the University oral exam.
2. In any term in which a University dissertation/thesis is submitted or at the end of which a graduate degree is conferred, unless the student was registered the prior term.
3. Normally, in any term in which the student receives financial support from the University.
4. In any term for which the student needs to use University facilities such as on-campus housing, libraries, Cowell Health Service, and so on.
5. For international students, in any term of the academic year for which they have non-immigrant status (for example, a J1 or F1 visa).

Individual students may also find themselves subject to the registration requirements of other agencies (for example, external funding sources such as the Veteran’s Administration). Course work and research are expected to be done on campus unless the department gives prior approval for study in absentia and a petition for in absentia registration is approved by the Registrar’s Office.

LEAVES OF ABSENCE

Graduate students who do not meet the requirement for continuous registration during the academic year must obtain an approved leave of absence, in advance, for the term(s) they will not be registered. The leave of absence must be reviewed for approval by the chair or director of graduate studies of the student’s major department and, if the student is in the United States on a visa, by the Bechtel International Center.

Leaves of absence are granted for a maximum of one calendar year. Leave requested for a longer period are approved only in exceptional circumstances (for example, mandatory military service). An extension of leave (a maximum of one year) for students in master’s programs or for doctoral students not yet admitted to candidacy, is approved only in unusual circumstances. Extension requests must be made before the expiration of the original leave of absence.

Students on leave of absence are not registered at Stanford and, therefore, do not have the rights and privileges of registered students. They cannot fulfill any official department or University requirements during the leave period.

Students on leave may complete course work for which an Incomplete grade was awarded in a prior term and are expected to comply with the usual one-year time limit for resolving incompletes.

REINSTATMENT

Students who fail to be either registered or approved for a leave of absence by the start of a term have to apply for reinstatement through the Graduate Admissions Office before they can return to the same degree program. The decision to approve or deny reinstatement is made by the student’s department or program. Departments are not obliged to approve reinstatements of students. Reinstatement decisions may be based on the applicant’s academic status when last enrolled, activities while away from campus, the length of the absence, the perceived potential for successful completion of the program, and the ability of
the department to support the student both academically and financially, as well as any other relevant factors or considerations.

Reinstatement information is available from the Graduate Admissions Office. A fee is required. Reinstatement applications must be submitted by the first day of the term for which reenrollment is requested if the student is registering for courses.

RESIDENCY

At Stanford, as at other research universities, each advanced degree program has a residency requirement of a minimum number of full-tuition quarters of registration or the equivalent in partial tuition quarters. Where more than one advanced degree is pursued, the residency requirement may be unique to that particular combination of degrees.

The residency requirements for most degrees and degree combinations are listed in the chart below. Residency measures tuition assessments; the number of course units attempted or completed has no bearing on residency. It should also be noted that the residency requirement represents the minimum tuition requirement for a degree; an individual student, depending on his or her program, preparation, and choices, may need to accrue more residency than the requirement states to earn the degree.

The fundamental reason for this requirement is educational: the minimum residency fixed for each program is the shortest period that students generally need to attain the level of expertise that a particular Stanford advanced degree signifies, by completing specified course work and other degree requirements, and by immersing themselves in the intellectual life of the University.

The residency requirement also ensures that a reasonable proportion of the University's expenses for providing the requisites of a high quality education are met from tuition income, particularly the expense of small classes and the need for state-of-the-art laboratory facilities and comprehensive library collections. These expenses remain constant even if, as sometimes happens, a student has no Stanford counterparts and/or research department. A maximum of 12 units of courses may be granted transfer residency credit for department course requirements at the department's discretion, but cannot be applied to Stanford's minimum unit requirement for the degree.

In such cases, the student can receive the degree early but must pay tuition for the full residency period. A tuition deficiency (a percent of residency less than the required number of quarters) for a degree may be paid to obtain the degree or to qualify for Terminal Graduate Registration (TGR) status.

Residency is stated in terms of full-tuition quarters. Registration at the full-tuition rate (11 or more units during the academic year and 15 units during Summer Quarter) earns one quarter of residency. Residency for partial tuition quarters during the academic year accrues as follows: 3 units = .24, 4 units = .31, 5 units = .37, 6 units = .43, 7 units = .50, 8 units = .56, 9 units = .62, 10 units = .68.

Residency is most commonly accrued through registration at Stanford as a matriculated graduate student. Within applicable policy, it may also be earned through graduate work done elsewhere (see below), registration as a non-matriculated student at Stanford, or payment of a tuition deficiency.

Further information about the residency requirement is available from the Degree Progress Office in the Old Union.

RESIDENCY CREDIT FOR GRADUATE WORK DONE ELSEWHERE

After at least one quarter of enrollment, students pursuing an Engineer, Ed.S., D.M.A., Ed.D., or Ph.D. may apply for residency credit for graduate work done at another institution. Engineer or Ed.S. candidates who also earned their master's at Stanford are not eligible for transfer residency credit, nor are any master's degree students. The chart below shows the maximum number of transfer quarters that will be accepted towards Stanford's residency requirement for each degree or degree combination. Regardless of whether transfer residency credit is approved, transfer courses may be used to fulfill department course requirements at the department's discretion, but cannot be applied to Stanford's minimum unit requirement for the degree.

Students enrolled at Stanford who are going to study elsewhere during their degree program should obtain prior approval of any transfer residency sought before their departure.

The following criteria are used for awarding transfer residency credit for graduate-level work done at another institution:

1. Courses should have comparable Stanford counterparts that are approved by the student's department. A maximum of 12 units of courses with no Stanford counterparts and/or research units may be granted transfer residency credit.

2. The student must have been registered in a student category which yields graduate credit. The maximum amount of credit given for extension and non-matriculated (non-degree) courses is one quarter. No transfer credit is given for correspondence work.

3. Courses must have been taken after the conferral of the bachelor's degree. The only exception is for work taken through programs structured like the Stanford coterminal bachelor's/master's program.

4. Courses must have a grade point average (GPA) of 'B' or better. Pass grades are accepted only for courses for which letter grades were not an option and for which the standard of passing is 'B'-quality work.
5. Courses must have been taken at a regionally accredited institution in the U.S. or at an officially recognized institution in a foreign country. Courses taken at foreign universities must be at the level of study comparable to a U.S. graduate program.

The Application for Residency Credit for Graduate Work Done Elsewhere is reviewed by the department and the Degree Progress Office.

### RESIDENCY AND MINIMUM UNITS REQUIREMENTS

<table>
<thead>
<tr>
<th>Degree</th>
<th>Min. # of Units</th>
<th>Min. # of Full-Tuition Qtrs. (Residency)</th>
<th>Max. Allowable Transfer Residency Credit (in qtrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.M.</td>
<td>36-45</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>M.S./ M.A.T.</td>
<td>(see note 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.M./ M.S. in Cotermin Program</td>
<td>36-45 see notes</td>
<td>2 and 3</td>
<td>0</td>
</tr>
<tr>
<td>A.M./ M.S. plus A.M./ M.S.</td>
<td>36-45 unduplicated units beyond first</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>M.F.A.</td>
<td>48-54</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Engineer</td>
<td>36-45 unduplicated units beyond A.M./ M.S.</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Ed.S.</td>
<td>45 unduplicated units beyond A.M./ M.S.</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>plus Ph.D.</td>
<td>45 unduplicated units beyond A.M./ M.S. plus 36 unduplicated units for Ph.D.</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Ph.D./ D.M.A./ Ed.D.</td>
<td>3 years of resident course work and research beyond A.B./B.S., including at least 72 units of course work and research done at Stanford</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>plus A.M./ M.S.</td>
<td>72 units (36 unduplicated for each degree)</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>

plus two A.M./ M.S. 108 units (36 unduplicated for each degree) 9 0

plus Engr. Engineer requirements plus 36 unduplicated units for the doctoral degree 9 3 (0 if A.M./ M.S. completed at Stanford)

plus M.D. Ph.D. requirements plus Ph.D. qtrs. Min. 3 0

plus M.D. plus M.B.A. Ph.D. requirements plus 100 GSB units 9 min., including 13 M.D. qtrs. 0

two Ph.D.s 36 unduplicated units beyond the first Ph.D. 12 3

two Ph.D.s plus one A.M./ M.S. 36 unduplicated units for each degree beyond the first Ph.D. 12 3

M.D. 221 units 13 Med. School qtrs. If transfer students, 3 qtrs. and 65 units (first 6 qtrs. and 130 units) (second year) 0

M.D. plus one A.M./ M.S. M.D. requirements plus 36 units 13 Med. School qtrs. 0

M.D. plus two A.M./ M.S. M.D. requirements plus 36 units unduplicated with first 3 qtrs. 0

M.D. plus Ph.D. M.D. requirements plus 36 units 13 Med. School plus min. 3 for Ph.D. 0

M.D. plus M.B.A. M.D. requirements plus GSB plus 6 GSB qtrs. 0

M.D. plus J.D. M.D. requirements plus School qtrs. plus 6 Law School semesters 0

M.L.S. 30 semester units 2 Law School semesters 0
J.S.M. 26 2-4 Law School semesters, 0
   units depending on program

J.S.D. J.D. requirement 2 Law School 0
     plus 26 units semesters

J.D. 68 additional law units beyond first semester 0
       6 Law 2 semesters

J.D. J.D. requirement 6 Law School 0
     plus one 36 unduplicated semesters
     A.M./ M.S. A.M./M.S.

J.D. J.D. requirement 6 Law School 0
     plus two unduplicated plus 3 qtrs.
     A.M./ with first A.M./M.S. for second
     M.S. A.M./M.S. A.M./M.S.

J.D. 57 J.D. units plus M.B.A. School and 0
     requirement 6 GSB qtrs.

J.D. J.D. requirement 6 Law School 0
     plus M.D. School and
     M.D. M.D. requirement plus 13 Med
              School qtrs.

M.B.A. 100 units 6 GSB 0
     plus (84 in GSB) qtrs. plus
M.D. plus M.D 13 Med
     requirement School qtrs.

Notes—
1. The specific unit requirement for each master’s degree program is determined by the department. The University minimum requirement is 36 unduplicated units; department requirements may be higher.
2. The residency requirement for coterminal bachelor’s/master’s degrees is a combination of residency required for the undergraduate degree(s) and residency required for the master’s. The combined residency requirement for a student pursuing an A.B., B.S., or B.A.S. and a coterminal master’s degree can be fulfilled in either of two different ways:
   a. Completing 15 full-tuition quarters, or equivalent in partial tuition quarters. (At least nine must be completed at Stanford, but six quarters may be credited from transfer work that has been accepted towards the undergraduate degree. Fifteen quarter units of transfer work are credited as one full-time quarter. Advanced Placement units are not credited towards the 15-quarter requirement.)
   b. Completing 3 full-tuition quarters at Stanford (or equivalent in partial tuition quarters), after having earned 180 units. (Advanced Placement and undergraduate transfer units on the student’s transcript assist the student in reaching the 180-unit milestone sooner, but cannot be counted towards the three required quarters thereafter.)

If the coterminal student is earning dual undergraduate degrees (an A.B. and a B.S.) instead of a single bachelor’s degree, the residency requirement is higher but follows the same rules as above. In item 2a, 18 full-tuition quarters must be completed by the dual degree coterm instead of 15. In item 2b, the equivalent of six full-tuition quarters (instead of three) must be completed at Stanford after the student has earned 180 units.

3. Coterminal students earning their master’s degree in the School of Engineering must pay for a minimum of three full-tuition quarters at the tuition rate for graduate Engineering students to meet the residency requirement.

UNIVERSITY MINIMUM UNITS REQUIREMENT

Each Stanford graduate degree or combination of degrees is subject to a requirement specifying the minimum number of units that must be earned at Stanford. The minimum units requirement for most degrees and degree combinations is listed in the chart above.
The minimum units requirement measures the units completed by the student, without regard for whether the units were earned in courses required for the degree and/or in courses that are not part of the department’s course requirements. Study at another institution never counts towards the minimum units requirement, unless the courses were taken through Stanford’s Exchange Scholar Program or formal exchange program with U.C.-Berkeley or U.C. San Francisco.

When multiple degrees are being pursued, units must be “unduplicated.” This means that units counted towards one degree may not be counted again towards another.

For all graduate degrees, the University’s expectation is that the units counted towards the minimum unit requirement are primarily in graduate courses. The University has set specific requirements for units applied to the minimum unit requirement for the A.M., M.S., M.A.T, and M.F.A. degrees: all units must be in courses at or above the 100 level and at least 50 percent of those must be courses designated primarily for graduate students (typically at least the 200 level). Units earned in courses below the 100 level may never be counted towards the minimum unit requirement for the master’s degree. Department specifications for the level of course work accepted for a particular master’s degree program may be higher than the University’s specifications.

SATISFACTORY PROGRESS REQUIREMENTS

The academic progress requirements for graduate students include timely completion of department and program requirements, such as admission to candidacy, successful completion of qualifying exams, and so on. The standards for students in professional degree programs are described in the bulletins for the Schools of Business, Law, and Medicine. Students in other degree programs must also meet the following standards of satisfactory progress as indicated by registration and reporting of grades.

Graduate students registered at full tuition must enroll for at least 11 units and must pass, over the course of three quarters, a total of 24 units, and at least 8 units per term. Those registered at the 9-unit rate must pass, over the course of three quarters, a total of 18 units, and at least 6 units per term. Students with permission to register for 8 units or fewer must complete a proportionate number of units, unless other requirements are specified.

Department guidelines that set higher standards (as to either units to be completed or grades to be maintained) take precedence over the University policy.

Students identified as not meeting the requirements for satisfactory progress are reviewed by their departments to determine whether the problem lies with administrative matters such as reporting of grades or with academic performance. Students have the opportunity to explain any special circumstances. Approval for continuation in the degree program is contingent on agreement by the student and department to a suitable plan to maintain satisfactory progress in subsequent quarters. Dismissal of graduate students is addressed below.

Graduate students who have been granted Terminal Graduate Registration (TGR) status must enroll each term in the TGR course (801 for master’s and Engineer programs or 802 for doctoral programs) in their department in the section appropriate for the adviser. An ‘N’ grade signifies unsatisfactory progress must be received each quarter to maintain registration privileges. An ‘N-’ grade indicates unsatisfactory progress. The first ‘N-’ grade constitutes a warning. A second consecutive ‘N-’ grade will cause the student to be denied further registration until a written plan for completion of degree requirements has been approved by the department. Subsequent ‘N-’ grades are grounds for dismissal from the program.

GUIDELINES FOR DISMISSAL OF GRADUATE STUDENTS FOR ACADEMIC REASONS

Admission to graduate programs at Stanford is highly selective. It is anticipated that every admitted student will be able to fulfill the requirements for the advanced degree. This document provides guidelines for the unusual circumstance that a department must consider dismissal of a graduate student for academic reasons. These guidelines apply to all advanced degree programs except those in the Schools of Law or Business or the M.D. program in the School of Medicine. Business, Law, and M.D. programs follow guidelines issued by the respective school.

The principal condition for continued registration is satisfactory academic progress towards the University and department requirements for that program. The guidelines that follow specify procedures for dismissal of graduate students who are not making satisfactory progress. In all such cases, the department (through the chair, the Director of Graduate Studies, or the student’s faculty adviser) will:

1. As early as possible, warn students, in writing, of their unsatisfactory progress. A detailed explanation of the reason for the warning must be provided.
2. Consider extenuating circumstances.
3. Place a summary of department discussions, votes, and decisions and any correspondence about this matter in the students’ files.
4. Provide students the opportunity to examine their department files, if requested.
5. Provide students with information on their rights to appeal under the Student Academic Grievance Procedures. (These are included in this bulletin.)

Careful records of department decisions safeguard the rights of both students and faculty.

ADDITIONAL SPECIFICS FOR DEGREES WITH CANDIDACY

Before Candidacy—A department committee may vote to dismiss a student who is clearly not making academic progress before review for admission to candidacy. Before considering dismissal, the committee should communicate with the student (which may include a meeting with the student) concerning his or her academic performance and how to correct deficiencies.

In a review for admission to candidacy, if the department votes not to recommend the student for admission to candidacy, the vote will result in the dismissal of the student from the program. The Director of Graduate Studies or the student's adviser shall communicate the department's decision to the student in writing and orally. The student may submit a written request for reconsideration. The committee shall respond in writing to the request for reconsideration; it may refuse to reconsider its decision.

During Candidacy—When a student admitted to candidacy is not making satisfactory progress, the student's adviser, the Director of Graduate Studies, and other relevant faculty should meet with the student. A written summary of these discussions shall be sent to the student and the adviser and added to the student's department file. The summary should specify the student's academic deficiencies, the steps necessary to correct them, and the period of time that is allowed for their correction (normally a minimum of one academic quarter). At the end of the warning period, the department's Graduate Studies Committee should review the student's progress and notify the student of its proposed actions. If the student has made satisfactory progress, he or she should be notified in writing that the warning has been lifted.

If at the end of the warning period the student has not made satisfactory progress, the committee may initiate proceedings for dismissal. The student shall be notified, in writing, that the case will be considered at an impending department committee meeting. The student has the right to be invited to attend a portion of the scheduled meeting and to present his or her own case; a student may also make this case to the committee in writing.

After full discussion at the department committee meeting, the committee, without the student present, reviews the case and votes on the issue of dismissal. A minimum of three faculty members must be present, and a decision is by majority vote. The student is sent a written summary of the discussion, including the committee's decision and the reasons for it. The student may submit a written request for reconsideration. The department committee may refuse to reconsider its decision. The committee's response to the request for reconsideration shall be made in writing.

CONFERRAL OF DEGREES

Upon recommendation to the Senate of the Academic Council by the faculty of the relevant departments or schools and the Committee on Graduate Studies, degrees are awarded four times each year, at the conclusion of Autumn, Winter, Spring, and Summer terms. All diplomas, however, are prepared and awarded in Spring Quarter. Stanford University awards no honorary degrees.

Students must apply for conferral of a graduate degree by filing an Application to Graduate before the deadline of each term. The application should be filed preferably in the second week, but no later than the last day of classes of the conferral quarter, as listed on the University calendar. A separate application must be filed for each degree program and for each conferral term. Applications are filed through Axess, the on-line service which allows students to update their administrative/academic records.

Requests for conferral are reviewed by the Degree Progress Office, and the student's department to verify completion of degree requirements. Registration is required in the conferral term or the term immediately preceding. Students with unmet financial obligations resulting in the placement of a hold on their registration will not receive a transcript, statement of completion, degree certificate, or diploma until the hold is released by the Bursar's Office.

Students who wish to withdraw a request for conferral or make changes to the Application to Graduate should notify the Degree Progress Office in writing. Students who withdraw their graduation applications or fail to meet degree requirements must reapply to graduate for a subsequent term.

CHANGES OF DEGREE PROGRAMS

Graduate students are admitted to Stanford for a specific degree program. Students who have attended Stanford for at least one term and who are currently enrolled or on an approved leave of absence may submit a Graduate Program Authorization Petition to make one of the following changes: (1) change to a new degree program in the same department; (2) change to a new degree program in a different department; (3) add a new degree program in the same or a different department to be pursued with the existing program.
It is important that the attempt to add or change degree programs be made while enrolled. Otherwise, a new Application for Graduate Admission must be submitted and an application fee paid. The Graduate Program Authorization Petition is submitted directly to the department in which admission is requested. If applying for a higher degree program, students may also be required to submit other application materials such as GRE Subject Test scores, a statement of purpose, or new letters of recommendation.

International students changing departments or degree programs must also obtain the approval of the Foreign Student Adviser at the Bechtel International Center. If the requested change lengthens their stay, they also are required to submit verification of sufficient funding to complete the new degree program.

Students who wish to terminate study in a graduate program should submit to the department a letter indicating the program from which they wish to withdraw and the effective date. To return to graduate study thereafter, the student is required to apply for reinstatement (if returning to the same degree program) or admission (if applying to a different program). Both applications require payment of a fee.

DEGREE-SPECIFIC REQUIREMENTS

MASTER OF ARTS AND MASTER OF SCIENCE

In addition to completing the general requirements for advanced degrees and the requirements specified by their department, candidates for a Master of Arts (A.M.) or Master of Science (M.S.) degree must complete their degree requirements within the time limit specified below and must outline an acceptable program of study on the Master's Degree Program Proposal.

MASTER'S PROGRAM PROPOSAL

Students pursuing an A.M., M.F.A., M.A.T., or M.S. are required to submit an acceptable program proposal to their department during the first quarter of enrollment. Coterminal students must submit the proposal during the first quarter after their completion of 180 units. The program proposal establishes a student's individual program of study to meet University and department degree requirements. Students must amend the proposal formally if their plans for meeting degree requirements change.

In reviewing the program proposal or any subsequent amendment to it, the department confirms that the course of study proposed by the student fulfills all department course requirements (for example, requirements specifying total number of units, course levels, particular courses, sequences, or substitutes). The department confirms that all other department requirements (for example, required projects, foreign language proficiency, or qualifying exams) are listed on the form and that all general University requirements (minimum units, residency, and so on) for the master's degree will be met through the proposed program of study.

TIME LIMIT FOR COMPLETION OF THE MASTER'S DEGREE

All requirements for a master's degree must be completed within three years after the student's first term of enrollment in the master's program (five years for Honors Cooperative students). Students pursuing a coterminal master's degree must complete their requirements within three years of their first quarter of graduate standing.

The time limit is not automatically extended by a student's leave of absence. All requests for extension, whether prompted by a leave or some other circumstance, must be filed by the student before the conclusion of the program's time limit. The maximum extension granted is one additional year. Extensions require review of academic progress and any other relevant factors, and approval by the department.

MASTER OF BUSINESS ADMINISTRATION

The degree of Master of Business Administration (M.B.A.) is conferred on candidates who have satisfied the requirements established by the faculty of the Graduate School of Business and the general requirements for advanced degrees. Full particulars concerning the school requirements are found in the Graduate School of Business bulletin. The M.B.A. must be completed within the time limit for completion of the master's degree.

MASTER OF ARTS IN TEACHING

The program leading to the Master of Arts in Teaching (M.A.T.) is designed for experienced teachers or for individuals who have previously completed programs of teacher preparation. In addition to completing the general requirements for advanced degrees and the program requirements specified by the School of Education and by one of the academic departments participating jointly in the program, M.A.T. candidates must fulfill the requirements for a master's program proposal as specified above and complete their degrees within the time limit for completion of the master's degree.

MASTER OF FINE ARTS

In addition to completing the general requirements for advanced degrees and the program requirements specified in the "Art" section of this bulletin, candidates for the degree of Master of
Fine Arts (M.F.A.) must fulfill the requirements for a master’s program proposal and complete their degrees within the time limit for completion of the master’s degree, as specified above.

ENGINEER

In addition to completing the general requirements for advanced degrees and the requirements specified by their department, candidates for the degree of Engineer must be admitted to candidacy and must complete a thesis per the specifications below.

CANDIDACY

The Application for Candidacy for Degree of Engineer is an agreement between the student and the department on a specific program of study to fulfill degree requirements. Students must apply for candidacy by the end of the second quarter of the program. Honors Cooperative students must apply by the end of the fourth quarter of the program. Candidacy is valid for five calendar years.

THESIS

A University thesis is required for the Engineer degree. Standards for professional presentation of the thesis have been established by the Committee on Graduate Studies and are detailed in Directions for Preparing Theses for Engineer Degrees, available from the Degree Progress Office in the Old Union.

The deadline for submission of theses for degree conferral in each term is specified by the University calendar. Three copies of the thesis, bearing the approval of the adviser under whose supervision it was prepared, must be submitted to the Degree Progress Office before the quarterly deadline listed on the University calendar. A fee is charged for binding copies of the thesis.

Registration is required for the term, or the immediately preceding term, in which the thesis is submitted. The period between the last day of final exams of one term and the first day of the subsequent term is considered an extension of the earlier term. Students submitting a thesis during this period would meet the registration requirement but would be eligible for degree conferral only in the subsequent term.

EDUCATIONAL SPECIALIST

In addition to completing the general requirements for advanced degrees and the program requirements specified in the “Education” section of this bulletin, candidates for the degree of Educational Specialist (Ed.S.) must complete a field-based project.

MASTER OF LEGAL STUDIES

Admission to study for the Master of Legal Studies degree (M.L.S.), a nonprofessional degree, is granted to students who hold the Doctor of Philosophy (Ph.D.) or other nonlaw doctoral degree, or who have been admitted to a nonlaw doctoral program and have completed a program of study amounting to 45 quarter units or 30 term units of work toward the doctorate, and who meet an admission standard equivalent to that required of candidates for the Doctor of Jurisprudence degree.

The M.L.S. degree is conferred upon candidates who, in not fewer than two academic terms in residence and in not more than two consecutive academic years, successfully complete 30 term units of work in the School of Law, including three first-year courses in the first autumn term and at least one course or seminar requiring a research paper. All work shall conform to the rules and regulations of the University and the School of Law.

DOCTOR OF JURISPRUDENCE

The degree of Doctor of Jurisprudence (J.D.) is conferred on candidates who satisfactorily complete courses in law totaling the number of units required under the current Faculty Regulations of the School of Law over not less than three academic years and who otherwise have satisfied the requirements of the University and the School of Law.

DOCTOR OF MUSICAL ARTS

The degree of Doctor of Musical Arts (D.M.A.) is conferred on candidates who have satisfied the general requirements for advanced degrees, the program requirements specified in the “Music” section of this bulletin, and the candidacy requirement as described below in the “Doctor of Philosophy” section.

DOCTOR OF EDUCATION

In addition to completing the general requirements for advanced degrees and the requirements specified by the School of Education, candidates for the Doctor of Education (Ed.D.) degree must fulfill the following requirements as detailed in the “Doctor of Philosophy” section below: candidacy, University oral examination, and dissertation.

MASTER OF THE SCIENCE OF LAW

The degree of Master of the Science of Law (J.S.M.) is conferred upon candidates who have completed one academic year (26 term-units) with distinction in accordance with the rules of the University and the School of Law.

The degree is primarily designed for those qualified students who hold a J.D. or its equivalent and who are at the Stanford School of Law for independent reasons (for example, as teaching fellows) and who wish to combine work toward the degree with their primary academic
activities. Specially qualified lawyers, public officials, academics, and other professionals who have worked outside the United States may apply for the degree through the Stanford Program in International Legal Studies (SPILS). Full particulars concerning requirements may be found in the Stanford University bulletin School of Law.

DOCTOR OF THE SCIENCE OF LAW

The degree of the Doctor of the Science of Law (J.S.D.) is conferred upon candidates who hold a J.D. or its equivalent, who complete one academic year in residence, and who, as a result of independent legal research, present a dissertation that is, in the opinion of the faculty of the School of Law, a contribution to knowledge. Such work and dissertation shall conform to the rules of the School of Law and the University, as described below in the “Doctor of Philosophy” section.

Candidacy is limited to students of exceptional distinction and promise. Full particulars concerning requirements may be found in the Stanford University bulletin School of Law.

DOCTOR OF MEDICINE

Candidates for the degree of Doctor of Medicine (M.D.) must satisfactorily complete the required curriculum in medicine. All requirements for the M.D. degree are detailed in the Stanford University School of Medicine Catalog.

DOCTOR OF PHILOSOPHY

The degree of Doctor of Philosophy (Ph.D.) is conferred on candidates who have demonstrated substantial scholarship, high attainment in a particular field of knowledge, and ability to do independent investigation and present the results of such research. They must satisfy the general requirements for advanced degrees, the program requirements specified by their departments, and the doctoral requirements described below. The option for a Ph.D. minor is also described below, though it is not a Ph.D. requirement.

CANDIDACY

Admission to a doctoral degree program is preliminary to, and distinct from, admission to candidacy. Admission to candidacy for the doctoral degree is an acknowledgment of the student’s potential to complete successfully the requirements of the degree program. Students are expected to complete department qualifying procedures and apply for candidacy by the end of their second year in the Ph.D. program. Honors Cooperative students must apply by the end of their fourth year.

The Application for Candidacy specifies a departmentally approved program of study to fulfill degree requirements, including required course work, language requirements, teaching requirements, dissertation (final project public lecture-demonstration for D.M.A.), and University oral examination (for Ph.D. and Ed.D.). At least 3 units of work must be taken with each of four Stanford faculty members.

If the Ph.D. student is pursuing a minor, approval by the department awarding the minor is also required on the Application for Candidacy.

TIME LIMIT FOR COMPLETION OF A DEGREE WITH CANDIDACY

All requirements for the degree must be completed before candidacy expires. Candidacy is valid for five years unless terminated by the department for unsatisfactory progress. The time limit is not automatically extended by a student’s leave of absence. All requests for extension, whether prompted by a leave or some other circumstance, must be filed by the student before the conclusion of the program’s time limit. The maximum extension granted is one additional year. Extensions require review by the department of a dissertation progress report and timetable for completion of the dissertation.

TEACHING REQUIREMENTS

A number of departments require their students to teach for one or more quarters during their doctoral programs. Detailed information is included in the department sections of this bulletin.

FOREIGN LANGUAGE REQUIREMENT

Some departments require a reading knowledge of one or more foreign languages as indicated in department sections of this bulletin. Fulfillment of language requirements must be endorsed by the chair of the major department on the Foreign Language Report form.

UNIVERSITY ORAL EXAMINATION

A University oral examination is a requirement of the Ph.D. and Ed.D. degrees. The purpose of the examination is to test the candidate’s command of the field of study and to confirm fitness for scholarly pursuits. Departments determine when, after admission to candidacy, the oral examination is taken and whether the exam will be a test of knowledge of the field, a review of a dissertation proposal, or a defense of the dissertation.

Students must be registered in the term in which the University oral examination is taken. The period between the last day of final exams of one term and the first day of the following term is considered an extension of the earlier term. Candidacy must also be valid.

The University Oral Examination Committee consists of at least five Stanford faculty members: four examiners and the committee chair from another department. All members are normally on the Stanford Academic Council, and the chair must be a member. Emeritus faculty are also eligible to serve as examiners or chair of the committee.
(A petition for appointment of an examining committee member who is not on the Academic Council may be approved if that person contributes an area of expertise that is not readily available from the faculty.) The chair of the examining committee may not have a full or joint appointment in the adviser's or student's department, but may have a courtesy appointment in the department. The chair can be from the same department as any other member(s) of the examination committee and can be from the student's minor department provided that the student's adviser does not have a full or joint appointment in the minor department.

The University Oral Examination form must be submitted to the department graduate studies administrator at least two weeks prior to the proposed examination date. The examination is conducted according to the major department's adopted practice, but it should not exceed three hours in length, and it must include a period of private questioning by the examining committee.

Responsibility for monitoring appointment of the oral examination chair rests with the candidate's major department. Although the department cannot require the candidate to approach faculty members to serve as chair, many departments invite students and their advisers to participate in the process of selecting and contacting potential chairs.

The candidate passes the examination if the examining committee casts four favorable votes out of five or six, five favorable votes out of seven, or six favorable votes out of eight. Five members present and voting constitute a quorum. If the committee votes to fail a student, the committee chair sends within five days a written evaluation of the candidate's performance to the major department and the student. Within 30 days and after review of the examining committee's evaluation and recommendation, the chair of the student's major department must send the student a written statement indicating the final action of the department.

DISSERTATION

A Doctoral Dissertation is required for the Ph.D., Ed.D., and J.S.D. degrees. The doctoral dissertation must be an original contribution to scholarship or scientific knowledge and must exemplify the highest standards of discipline. The dissertation is approved for the school or department by the doctoral dissertation reading committee. Each member of the reading committee signs the signature page of the dissertation to certify that the work is of acceptable scope and quality. One reading committee member reads the dissertation in its final form and certifies on the Certificate of Final Reading that department and University specifications have been met.

Dissertations must be in English. Approval for writing the dissertation in another language is also the subject of the discipline. Such approval is routinely granted for dissertations in the Division of Literatures, Cultures, and Languages, in accordance with the policy of the individual department. Dissertations written in another language must include an extended summary in English.

Directions for preparation of the dissertation are available from the Degree Progress Office in the Old Union. The signed dissertation copies and accompanying documents must be submitted to the Degrees Progress Office on or before the quarterly deadline indicated in the University's academic calendar. A fee is charged for the microfilming and binding of the dissertation copies.

Registration is required for the term, or the immediately preceding term, in which the dissertation is submitted. The period between the last day of final exams of one term and the first day of the subsequent term is considered an extension of the earlier term. Students submitting a dissertation during this period would meet the registration requirement but would be eligible for degree conferral only in the subsequent term. At the time the dissertation is submitted, an Application to Graduate must be on file, all of the department requirements must be complete, and candidacy must be valid through the term of degree confer-ral.

DOCTORAL DISSERTATION READING COMMITTEE

The Doctoral Dissertation Reading Committee consists of the principal dissertation adviser and two other readers. At least one member must be from the student's major department. Normally, all members are on the Stanford Academic Council. The student's department chair may, in some cases, approve the appointment of a reader who is not on the Academic Council, if that person is particularly well-qualified to consult on the dissertation topic and holds a Ph.D. or equivalent foreign degree.

Former Stanford Academic Council members, emeritus professors, and non-Academic Council members may serve on a reading committee. If they are to serve as the principle dissertation adviser, however, the appointment of a co-adviser who is currently on the Academic Council is required.

The reading committee, as proposed by the student and agreed to by the prospective members, is endorsed by the chair of the major department on the Doctoral Dissertation Reading Committee form. This form must be submitted before approval of Terminal Graduate Registration (TGR) status or before scheduling a University oral examination that is a defense of the dissertation. The reading committee may be appointed earlier, according to the department timetable for doctoral programs. All subsequent changes to the reading committee must be approved by the chair of the major department.
Ph.D. MINOR

Students pursuing a Ph.D. may pursue a minor in another department or program to complement their Ph.D. program. This option is not available to students pursuing other graduate degrees. Ph.D. candidates cannot pursue a minor in their own major department or program.

Only departments that offer a Ph.D. may offer a minor, and they are not required to do so. The minor should represent a program of graduate quality and depth, including core requirements and electives or examinations. The department offering the minor establishes the core and examination requirements. Elective courses are planned by the students in conjunction with their minor and Ph.D. departments.

The minimum University requirement for a Ph.D. minor is 20 units of course work at the graduate level (courses numbered 200 and above). If a minor department chooses to require those pursuing the minor to pass the Ph.D. qualifying or field examinations, the 20-unit minimum can be reduced. All of the course work for a minor must be done at Stanford.

Units taken for the minor can be counted as part of the overall requirement for the Ph.D. of 72 units of graduate course work done at Stanford, but cannot be counted as part of the 36 unduplicated units for the Ph.D. itself. Courses used for a minor may not be used also to meet the requirements for a master’s degree.

A Ph.D. minor form outlining a program of study must be approved by the major and minor departments. This form is submitted at the time of admission to candidacy and specifies whether representation from the minor department on the University oral examination committee is required.

ADvising and Credentials

ADvising

By the start of their first term, students should be paired by the department with faculty advisors who assist them in planning a program of study to meet degree requirements. The department should also ensure that doctoral students are informed in a timely fashion about procedures for selecting a dissertation adviser, reading committee members, and orals committee members. Departments should make every effort to assist doctoral students who are not admitted to candidacy in finding an appropriate adviser.

Students are obliged to follow department procedures for identifying advisers and committee members for their dissertation reading and orals examinations.

Occasionally, a student’s research may diverge from the area of competence of the adviser, or irreconcilable differences may occur between the student and the faculty adviser. In such cases, the student or the faculty adviser may request a change in assignment. If the department decides to grant the request, every effort must be made to ensure that the student is paired with another suitable adviser. This may entail some modification of the student’s research project.

In the rare case where a student’s dissertation research on an approved project is in an advanced stage and the dissertation adviser is no longer available, a new adviser must be appointed, usually from the student’s reading committee. This may also require that a new member be added to the reading committee before the draft dissertation is evaluated, to keep the reconstituted committee in compliance with the University requirements for its composition.

Public School Credentials

Stanford University acts as agent for the California Commission on Teacher Credentialing in recommending students for credentials for service in California public schools upon completion of a Stanford approved program. The University offers complete training programs for the Single Subject Teaching Credential and the Preliminary Administrative Services Credential.

The student expecting to complete the fifth-year requirement for a teaching credential must submit a proposed course of study to the Credential Office in the School of Education at the beginning of the first quarter of study.
ACADEMIC POLICIES AND STATEMENTS

COMPLIANCE WITH UNIVERSITY REGULATIONS

Registration as a student constitutes an agreement to abide by University regulations such as those concerning admissions, registration, academic performance, student conduct, public health, use of the libraries, operation of vehicles on campus, University facilities, and the payment of fees and assessments. Many of these regulations are set forth in this bulletin while others are available in relevant University offices.

Graduate students should also take responsibility for informing themselves in particular of University policy on Intellectual Property, Environmental Health and Safety, and Scientific Misconduct. These policies are described in the Research Policy Handbook and the Graduate Student Handbook.

The University reserves the right to withhold registration privileges or to require the withdrawal of any student who is not in compliance with its regulations.

ACADEMIC INSTRUCTIONAL USE OF VERTEBRATE ANIMALS

It is the policy of Stanford University that the use of either live or deceased vertebrate animals for solely instructional purposes is permitted (1) when the cognizant instructor(s) judges that the educational goals of the program or course are best achieved by such usage and (2) when the Administrative Panel on Laboratory Animal Care determines that such usage is humane, proper, and appropriate and that it is consistent with government principles and regulations for the utilization and care of vertebrate animals used in teaching and research. Only the minimum number of animals essential to instructional objectives should be used. Instructors should be encouraged to use alternatives to animals whenever feasible.

INFORMATION TO STUDENTS

Academic departments and programs should alert prospective students if any courses required for a major or degree involve the use of animals. This requirement may be met by a statement to the effect that some required courses for certain degrees may involve the use of animals or animal tissue and that interested students should seek further information about such requirements from the department.

Instructors must inform their students during the first week of class if animals or animal tissue will or may be used as part of that course. Students who have concerns about the use of animals may then choose whether or not to take the class. Students should feel free to discuss their concerns with the instructor, but they should be aware that instructors and departments are not obligated to alter course requirements that are consistent with University policies.

PROCEDURES FOR USE OF ANIMALS

Any faculty member who intends to use vertebrate animals for teaching purposes must submit an Animal Use Protocol, signed by the department chair, to the Administrative Panel on Laboratory Animal Care. Reuse of previously preserved material requires no approval. Courses taught each year with no significant changes in animal usage must submit a Renewal Animal Use Protocol every year.

The protocol must include information about the sources from which animals are procured. In addition, the protocol must explain why animals are needed to achieve the goals of the course and must justify the species and the number of animals to be used. Questions from the Administrative Panel on Laboratory Animal Care regarding the species of animal chosen, the procurement process, the number of animals to be used, or other related matters must be resolved before the animals may be ordered.

Live vertebrate animals must be cared for according to the Division of Laboratory Animal Medicine policies and procedures governing the use of laboratory animals. Disposal of animal tissue must be in compliance with relevant health and safety regulations.

REGISTRATION AND RECORDS

REGISTRATION AND STUDY LISTS

Students register for each term by submitting a Registration Commitment through the mail, in person, or through the computerized registration system, Axess. No student may attend any classes without a valid student identification card.

As early as possible, but no later than the second Sunday of the quarter, students (including those with TGR status) must submit to the Registrar’s Office, via Axess, a study list to enroll officially in classes for the quarter. Students may not enroll in more units than their tuition charge covers, nor enroll in courses for zero units unless
those courses, like TGR, are defined as zero-unit courses. Undergraduate students are subject to academic load limits described in the “Amount of Work” section below.

The University reserves the right to withhold registration from, and to cancel the advance registration of, any student having unmet obligations to the University.

For full registration procedures, see the quarterly Time Schedule.

STUDY LIST CHANGES

Students may add courses or units to their study lists through the end of the third week of classes. (Individual faculty may choose to close their classes to new enrollments at an earlier date.) Courses or units may be added only if the revised program remains within the normal load limits.

Courses may be dropped by students through the end of the fourth week of classes, without any record of the course remaining on the student’s transcript. No drops are permitted after this point, regardless of the grade or notation recorded in the course.

A student may withdraw from a course after the drop deadline through the end of the eighth week of each quarter. In this case, a grade notation of ‘W’ (for “Withdrew”) is automatically recorded on the student’s transcript for that course. Students who do not officially withdraw from a class by the end of the eighth week are assigned the appropriate grade or notation by the instructor to reflect the work completed.

Through the end of the sixth week of classes, students may elect the grading option of their choice in courses where the option of letter or Credit/No Credit grading is offered.

If the instructor allows a student to take an ‘I’ (incomplete) in the course, the student must make the appropriate arrangements for that with the instructor by the last day of classes.

These policies reflect changes adopted by the Faculty Senate on June 2, 1994.

AMOUNT OF WORK

The normal amount of work for undergraduate students is 15 units per quarter; 180 units are required for graduation. Registration for fewer than 12 units is rarely permitted and will cause the undergraduate to be ineligible for certification as a full-time student. The maximum is 20 units (21 if the program includes a 1-unit activity course). The maximum may be exceeded only for compelling reasons. A past superior academic performance is not considered to be sufficient justification for exceeding the maximum. Petitions for programs of fewer than 12 or more than 20 units must be signed by the student’s adviser and submitted to the Office of Academic Standing.

Graduate students are not held to the unit limits above and may, under certain circumstances, register on a part-time basis. See the “Fees” section of this bulletin.

During the eight-week Summer Quarter, 16 units is the maximum for all students. For details, see the Stanford University bulletin, Summer Session Catalogue, 1998.

UNIT OF CREDIT

Every unit for which credit is given is understood to represent approximately three hours of actual work per week for the average student. Thus, in lecture or discussion work, for 1 unit of credit, one hour per week may be allotted to the lecture or discussion and two hours for preparation or subsequent reading and study. Where the time is wholly occupied with drawing, field, or laboratory work, or in the classroom work of conversation classes, three full hours per week through one quarter are expected of the student for each
unit of credit; but, where such work is supplement-
ed by systematic outside reading or experiment
under the direction of the instructor, a reduction
may be made in the actual drawing, field, labo-
ratory, or classroom time as seems just to the
department.

AUDITING

No person shall attend any class unless he or
she is a fully registered student enrolled in the
course or meets the criteria for auditors below.
Auditors are not permitted in courses that involve
direct participation such as language or labora-
tory science courses, art courses with studio work,
or other types of individualized instruction. Au-
ditors are expected to be observers rather than active participants in the courses they attend,
unless the instructors request attendance on a
different basis. Stanford does not confer credit for
auditing, nor is a permanent record kept of courses
audited.

These are the only individuals eligible to au-
dit courses:

1. Students who register on a full-tuition basis may
audit lecture courses in addition to the program
taken for credit, if they obtain the instructors’
consent. (Students registered on a less than full-
tuition basis may not audit additional courses
without payment of the regular tuition that
would be charged for credit registration.)
Changing from auditing to credit basis or vice
versa is not permitted after the first two weeks
of the quarter.

2. Faculty may attend another faculty member’s
class upon his or her invitation.

3. A member of the University staff may audit
lecture courses with a letter from his or her
department head certifying that the auditing will
improve the employee’s effectiveness and that
time off will be approved if needed. Consent
of the instructor is required and an auditor’s
courtesy card must be obtained from the Reg-
istrar’s Office.

4. Spouses of University faculty and staff may
audit lecture courses, if permission from the
instructors has been received and an auditor’s
courtesy card has been obtained from the Reg-
istrar’s Office.

5. Stanford alumni and their spouses may request
auditor status from the Registrar’s Office; this
requires payment of Permit to Attend tuition
($1,690 per quarter) and the consent of the
instructors of the courses to be audited.

6. Under unusual circumstances and within cer-
tain conditions, other persons may be eligible
to audit lecture courses, but permission must
first be obtained from the Registrar’s Office and
payment of Permit to Attend tuition required.
In all cases of auditing, the instructor’s consent
is required.

WITHDRAWAL FOLLOWING
REGISTRATION

Students who wish to withdraw from the cur-
rent quarter, or from a quarter for which they have
registered in advance and do not wish to attend,
must file leave of absence petitions with the Reg-
istrar’s Office. More information is available in the “Refunds” section of this bulletin and, for
graduate students, in General Requirements in the
“Graduate Degrees” section of this bulletin.

STANFORD UNIVERSITY
ID NUMBER

The Stanford student ID is a number assigned
to each student’s academic record for unique iden-
tification. It is printed on the Stanford Universi-
y ID card and on documents distributed by the
Registrar’s and other administrative offices. The
student ID number is considered directory infor-
mation.

IDENTIFICATION CARDS

ID cards are available to registered students,
faculty, and regular staff through the Office of the
Registrar, Old Union.

Married students or students with a domestic
partner (same or opposite sex) may obtain a cour-
tesy identification card for their spouse/partner
through the Registrar’s Office, Old Union. The
spouse/partner card enables use of some campus
services during terms for which the student is
registered.

Similar courtesy cards are also available to the
spouses and same-sex domestic partners of fac-
culty and regular staff.

PERSONAL
IDENTIFICATION NUMBERS

Students eligible to use on line services such
as Axess obtain a PIN through the Registrar’s
Office. The PIN, in combination with the assigned
University identification number, uniquely identi-
ﬁes the student and serves in place of a signa-
ture on electronic forms. PINs must remain con-
ﬁdential. It is a violation of University policy to
misrepresent yourself in any way. Use of anoth-
er’s PIN can result in loss of student privileges or
other disciplinary action.

RECORDS
TRANSCRIPTS

Transcripts of Stanford records are issued by the
Registrar’s Office upon the student’s request
when submitted in writing or via the online Axess
system. There is no charge for official transcripts.
The Transcripts Office attempts to maintain a 72-
hour service. The courses taken and grades giv-
en in one quarter will not appear on any student’s
transcript until all grades received by the grade deadline have been recorded; generally, this is two weeks after final exams. The University reserves the right to withhold transcripts or records of students with unmet obligations to the University.

CERTIFICATION OF ENROLLMENT OR DEGREES

Requests for official certification of enrollment or degrees should be addressed to the Registrar’s Office. Verbal confirmation of registration or degrees earned can often be made at the time of the phone inquiry. Requests for written certification of enrollment should be submitted by the student to the Registrar’s Office.

Degrees are conferred quarterly, but diplomas are issued only in June. After conferral, the degree awarded to a student can be verified by contacting the Registrar’s Office for an official transcript, a certification form, or a verbal confirmation via telephone. Requests for transcripts must be made by the student in writing or through Axess.

Full-time enrollment for undergraduates is considered to be enrollment in a minimum of 12 units of course work at Stanford. Work necessary to complete units from previous quarters will not count toward the 12 units necessary for full-time status in the current quarter. Enrollment in 8 to 11 units is considered half-time enrollment. Enrollment in 1 to 7 units is considered less-than-half-time, or part-time, enrollment.

All undergraduate students validly registered at Stanford are considered to be in good standing for the purposes of enrollment certification.

Stanford uses the following definitions to certify the enrollment status of graduate students:
- **Full-time**: 9 or more units
- **Half-time**: 6, 7 or 8 units
- **Part-time**: 5 or fewer units

Registered TGR students are certified as full-time.

Only information classified by the University as directory information can be confirmed to inquirers other than the student.

PRIVACY OF STUDENT RECORDS

NOTIFICATION OF RIGHTS UNDER FERPA

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. They are:

1. The right to inspect and review the student’s education records within 45 days of the date the University receives a request for access.

   The student should submit to the Registrar, Dean, Chair of the department, or other appropriate University official, a written request that identifies the record(s) the student wishes to inspect. The University official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the University official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.

2. The right to request the amendment of the student’s education records that the student believes are inaccurate or misleading.

   A student may ask the University to amend the record that he or she believes is inaccurate or misleading. The student should write the University official responsible for the record, clearly identify the part of the records he or she wants changed, and specify why it is inaccurate or misleading.

   If the University decides not to amend the record as requested by the student, the University will notify the student of the decision and advise the student of his or her right to a hearing regarding the request for amendment.

   Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.

3. The right to consent to disclosures of personally identifiable information contained in the student’s education records, except to the extent that FERPA authorizes disclosure without consent.

   One exception which permits disclosure without consent is disclosure to school officials with legitimate educational interests. A school official is a person employed by the University in an administrative, supervisory, academic or research, or support staff position (including law enforcement unit personnel and health staff); a person or company with whom the University has contracted (such as an attorney, auditor, or collection agent); a person serving on the Board of Trustees; or a student serving on an official committee, such as a disciplinary or grievance committee, or assisting another school official in performing his or her tasks.

   A school official has a legitimate educational interest if the official needs to review an education record in order to fulfill his or her professional responsibility.

   Another exception is that the University discloses education records without consent to officials of another school, in which a student seeks or intends to enroll, upon request of officials at that other school.

4. The right to file a complaint with the U.S. Department of Education concerning alleged failures by the University to comply with the requirements of FERPA. The name and address of the office that administers FERPA is: Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW., Washington, DC, 20202-4605.
DIRECTORY INFORMATION
The University regards the following items of information as "directory information," that is, information available to any person upon specific request (and without student consent):
Name
Gender
Date of birth
Place of birth
Directory address and phone number
Electronic mail address
Mailing address
Campus office address (for graduate students)
Secondary mailing or permanent address
Residence assignment and room or apartment number
Specific quarters or semesters of registration at Stanford
Stanford degree(s) awarded and date(s)
Major(s), minor(s), and field(s)
University degree honors
Institution attended immediately prior to Stanford

Students may prohibit the release of any of these items listed above by designating which items should not be released on the Privacy function of Axess.

Students, faculty, and others with questions regarding student records should contact the Registrar's Office.

CONSENT TO USE OF PHOTOGRAPHIC IMAGES
Registration as a student and attendance at or participation in classes and other campus and University activities constitutes an agreement by the student to the University's use and distribution (both now and in the future) of the student's image or voice in photographs, videotapes, electronic reproductions, or audiotapes of such classes and other campus and University activities.

If any student in a class where such photographing or recording is to take place does not wish to have his or her image or voice so used, the student should raise the matter in advance with the instructor.

EXAMINATIONS
MIDTERMS
Classes that give midterm examinations outside of regular class hours must: (1) announce the date and time during the first week of the academic quarter, and (2) provide reasonable alternative times to those students for whom these announced times are not convenient. According to Honor Code interpretations and applications, different examinations may be given at these alternative times.

END-QUARTER POLICY STATEMENT
The End-Quarter Period is a time of reduced social and extracurricular activity preceding final examinations. Its purpose is to permit students to concentrate on academic work and to prepare for final examinations.

In Autumn, Winter, and Spring Quarters, End-Quarter Period begins on the Sunday that begins the last week of classes. In Spring Quarter, final examinations begin on Friday; no classes are held on Thursday, the day before. In Summer Quarter, this consists of the weekend and the four class days preceding the final examinations, which take place on Friday and Saturday of the eighth week. (See the Time Schedule for dates.)

During the End-Quarter Period, classes are regularly scheduled and assignments made; this regular class time is used by instructors in whatever way seems best suited to the completion and summation of course material. Instructors should neither make extraordinary assignments nor announce additional course meetings in order to "catch up" in course presentations that have fallen behind. They are free, however, and even encouraged to conduct optional review sessions and to suggest other activities that might seem appropriate for students preparing for final examinations.

No graded homework assignments, mandatory quizzes, or examinations should be given during the End-Quarter Period except:
1. In classes where graded homework assignments or quizzes are routine parts of the instruction process.
2. In classes with laboratories where the final examination will not test the laboratory component. In such a case, the laboratory session(s) during the End-Quarter Period may be used to examine students on that aspect of the course.

Major papers or projects about which the student has had reasonable notice may be called due in the End-Quarter Period.

Take-home final examinations, given in place of the officially scheduled in-class examination, may be distributed in the End-Quarter Period. Although the instructor may ask students to return take-home examinations early in the final examination period, the instructor may not call them due until the end of the regularly scheduled examination time for that course. Such a policy respects the principle that students' final examinations are to be scheduled over a period of several days.

End-quarter examinations may not be held during this period. This policy preserves the instruction time for courses and protects students' opportunities for extensive review and synthesis of their courses.
During the End-Quarter Period, no musical, dramatic, or athletic events involving compulsory student participation may be scheduled, unless approved as exceptions by the Committee on Academic Appraisal and Achievement, nor may routine committee meetings be scheduled (such as those of the ASSU, the Senate of the Academic Council, or the committees of the President of the University) when such meetings normally would involve student participation.

Note—Students who believe that there are faculty who are violating End-Quarter policy should contact the Registrar's Office.

END-QUARTER EXAMINATIONS

Examinations are part of the process of education at the same time that they are a means to measure the student’s performance in course work. Their structure, content, frequency, and length are to be determined in accordance with the nature of the course and the material presented in it, subject only to the limitations contained herein.

Great flexibility is available regarding the types of examinations that an instructor may choose to employ. Examinations, including final examinations, may be, for example, in-class essay examinations, take-home essay examinations, objective examinations, oral examinations, or appropriate substitutes such as papers or projects. Instructors may use any type of examination, paper, or project, or any combination thereof, guided only by the appropriateness of the types of examinations, papers, or projects for the material upon which the student is being examined.

When the final examination is an in-class examination, the following regulations apply:

1. A three-hour period is reserved during examination week for the final examination in each course of more than 2 units. This examination period must be available for students, but not necessarily in its entirety, if an in-class examination is given. In courses with extraordinary meeting times, such that ambiguity might exist as regards the period reserved for the final examination, the schedule should be clarified and students informed no later than the end of the second week of the quarter.

2. Examinations in 1- or 2-unit courses must be completed by the end of the last class meeting before the End-Quarter Period, except in Summer Quarter when examinations must be completed during the last regularly scheduled class session.

When the final examination or its appropriate substitute is not an in-class examination (for example, when an instructor chooses to employ a take-home examination, paper, or project in lieu of an in-class examination), the following regulations apply:

1. The schedule and format of the final examination or its appropriate substitute shall be made known not later that the end of the second week of the quarter and, if changed subsequently, may be only an option of the plan originally announced by the instructor.

2. Although the instructor may ask students to return take-home examinations early in the final examination period, the instructor may not call them due until the end of the regularly scheduled examination time for that course.

In submitting official Study Lists, students commit to all course requirements, including the examination procedures chosen and announced by the course instructor. In selecting courses, students should take cognizance of the official schedule of final examinations announced in the quarterly Time Schedule. Students anticipating conflicts in final examination schedules should seek to resolve these with the instructors involved before submitting Study Lists at the end of the second week of the quarter. If accommodation cannot be made at that time, the student should revise his or her Study List in order to be able to meet the required final examination.

If unforeseen circumstances prevent the student from sitting for the regularly scheduled examination, instructors should make alternative arrangements on an individual basis. Such unforeseen circumstances include illness, personal emergency, or the student's required participation in special events approved as exceptions by the Committee on Academic Appraisal and Achievement (for example, athletic championships).

STATEMENT CONCERNING EARLY EXAMINATIONS

Students are reminded that taking final examinations earlier than the scheduled time is a privilege, not a right. They should request this privilege only in the event of extraordinary circumstances.

Since the final examination schedule is published quarterly in the Time Schedule at the time of course selection and enrollment, students are expected to make their academic plans in light of known personal circumstances that may make certain examination times difficult for them.

In general, faculty members are discouraged from giving final examinations earlier than the published and announced times. If faculty nevertheless decide to administer early examinations, either the questions should be completely different from those on the regularly scheduled examination or the early examination should be administered in a highly controlled setting. An example of such a setting would be a campus seminar room where the examination questions would be collected along with students' work and students would be reminded of their Honor Code obligations not to share information about the exami-
nation contents. Giving students easy opportunities to abuse the integrity of an examination is unfair to honest students and inconsistent with the spirit of the Honor Code.

Academic fields differ in the degree to which early examination requests present dilemmas for faculty. If, for example, an examination format consists of a small number of essay questions, where students would be greatly advantaged by knowing the question topics, faculty should be especially reluctant to allow early examinations unless they are willing to offer totally different examinations or a different kind of academic task, for example, a final paper in lieu of an examination.

GRADING SYSTEMS

GENERAL UNIVERSITY

The general University grading system is applicable to all schools of Stanford University except the Graduate School of Business, the School of Law, and M.D. students in the School of Medicine. Note that the GPA (grade point average) and rank in class are not computed under the general University grading system. Stanford does use an internal-only GPA which is based on units completed up to the time of conferral of the first bachelor's degree. This information is used for the internal purposes only and is not displayed on the official transcript which is sent outside the University.

DEFINITION AND EXPLANATION

The following reflects changes adopted by the Faculty Senate on June 2, 1994 and effective Autumn Quarter 1995-96. All grades/notations for courses taken in 1995-96 or later are to be visible on student transcripts.

A Excellent
B Good
C Satisfactory
D Minimal pass
Plus (+) and minus (-) may be used as modifiers with the above letter grades
NP Not Passed
NC No Credit (unsatisfactory performance, D+ or below equivalent, in a class taken on a satisfactory/no credit basis)
CR Credit (student-elected satisfactory; A, B, or C equivalent)
S No-option Satisfactory; A, B, or C equivalent
L Pass, letter grade to be reported
W Withdrew
N Continuing course
I Incomplete
RP Repeated Course
* No grade reported

NC The notation ‘NC’ represents unsatisfactory performance in courses taken on a Satisfactory/No Credit basis. Performance is equivalent to letter grade ‘D+’ or below.

NP The notation ‘NP’ is used by instructors in courses taken for a letter grade that are not passed.

CR In a course for which some students will receive letter grades, the ‘CR’ represents performance that is satisfactory or better when the student has elected the ‘CR’ grading option. This option is available in any course, subject to the consent of the instructor and department and to the student’s observance of the time limit for electing or dropping the option (the end of the sixth week of the quarter).

S For an activity course or a course in which the instructor elects to grade students only on a Satisfactory/No Credit basis, the ‘S’ represents performance that is satisfactory or better. For such a course, no letter grades may be assigned for satisfactorily completed work.

It should be noted that the Registrar is unable to record course grades submitted when the instructor has not observed the required distinction between ‘S’ and ‘CR.’

The Satisfactory options are intended to relieve the pressure on students for achievement in grades. The Satisfactory options in no way imply fewer or different course work requirements than those required of students who elect evaluation with a letter grade. A department may limit the number of Satisfactory courses to count for a major program. For those students admitted as freshmen for Autumn Quarter 1996-97 or later, no more than 36 units of Stanford course work in which a ‘CR’ or ‘S’ was awarded can be applied toward the 180 (225 if dual degrees are being pursued) units required for a bachelor’s degree. Students who enter Stanford as transfer students in 1996-97 or later are limited to 27 ‘CR’ or ‘S’ units applied to the 180/225 minimum.

L The ‘L’ is a temporary notation that represents creditable completion of a course for which the student will receive a permanent letter grade before the start of the next quarter. The ‘L’ is given when the instructor needs additional time to determine the specific grade to be recorded, but it is not appropriate if additional work is expected to be submitted by the student. A student receives unit credit for work graded ‘L.’

N The ‘N’ indicates satisfactory progress in a course that has not yet reached completion. Continuation courses need not continue at the
same number of units, but the grade for all quarters of such a course must be the same.

N- The 'N-' grade indicates unsatisfactory progress in a continuing course. The first "N-" grade constitutes a warning. The adviser, department chair, and students should discuss the deficiencies and agree on the steps necessary to correct them. A second "N-" should cause the student to be denied further registration until a written plan for the completion of the degree requirements has been submitted by the student and accepted by the department. Any "N-" grades received after that point are grounds for dismissal from the program.

I The 'I' is restricted to cases in which the student has satisfactorily completed a substantial part of the course work. No credit will be given until the course is completed and a passing grade received. When a final grade is received, all reference to the initial 'I' is removed.

In courses taken before 1994-95, satisfactory completion of the course work when an 'I' has been given is expected within one year from the date of the course's final examination, but an alternate time limit may be set by the instructor. Students may petition that these courses with an 'I' grade be removed from their records.

In a course taken 1994-95 or later, 'I' grades must be changed to a permanent notation or grade within one year (that is, prior to the first day of the fifth quarter which follows the course, including Summer). If the 'I' remains uncleared at that time, it is changed automatically by the Registrar's Office to an 'NP' or 'NC' as appropriate for the grading option selected. Courses from 1994-95 or later with an 'I' grade may not be dropped.

RP The notation 'RP' (meaning Repeated Course) replaces the original grade recorded for a course when a student retakes a course. (See repeated courses above.)

W The notation 'W' (meaning Withdrew) is recorded when a student withdraws from a course.

* When the Registrar receives an End-Quarter Report (EQR) from an instructor with a grade omitted, or receives an End-Quarter Report too late for processing with other End-Quarter Reports, "*" (no grade reported) shows as the grade for the course on a student's transcript. The asterisk may also be reported by the instructor when he or she is unable to record any other grade or symbol. The "*" symbol remains in the record until changed.

GENERAL

The back of the End-Quarter Report (EQR) sheet shall carry only information explaining the significance of the various forms of entries described therein and a calendar for required submission of grades. No description of a "curve" system shall appear on EQR sheets, and instructors are discouraged from awarding grades according to any predetermined distribution system.

A student who takes a course in a school or program of the University other than the one in which he or she is matriculated is subject to the grading system of the school or program in which the course is given.

REPORTING OF GRADES

All grades must be reported within 96 hours after the time and day reserved for the final examination, and in no case later than noon of the fourth day (including weekends) after the last day of the final examination period.

In the case of degree candidates in Spring Quarter, final grades must be reported within 24 hours of the end of the final examination period.

REVISION OF END-QUARTER GRADES

When duly filed in the Registrar's Office, end-quarter grades are final and not subject to change by reason of a revision of judgment on the instructor's part; nor are passing grades to be revised on the basis of a second trial (for example, a new examination or additional work undertaken or completed after the date of the End-Quarter Report). Changes may be made at any time to correct an actual error in computation or in transcribing, or where some part of the student's work has been unintentionally overlooked; that is, if the new grade is the one that would have been entered on the original report had there been no mistake in computing and had all the pertinent data been before the instructor, the change is a proper one.

If a student questions an end-quarter grade based on the grading of part of a specific piece of work (for example, part of a test) on the basis of one of the allowable factors mentioned in the preceding paragraph (for example, an error in computation or in transcribing, or work unintentionally overlooked, but not matters of judgment as mentioned below), the instructor may review the entire piece of work in question (for example, the entire test) for the purpose of determining whether the end-quarter grade was a proper one.

In general, changing an end-quarter grade is permitted on the basis of the allowable factors already mentioned whether an error is discovered by the student or the instructor; however, changing a grade is not permitted by reason of revision of judgment on the part of the instructor.
In the event that a student disputes an end-quarter grade, the established grievance procedure should be followed (see the "Guidelines for Student Academic Grievance Procedures" section of this bulletin).

**GRADUATE SCHOOL OF BUSINESS**

Effective September 1971, the following grade scale applies only to courses offered by the Graduate School of Business:

- **H** Distinction. Work that is of markedly superior quality.
- **P+** Work that is of high quality and exceeds in a significant way all of the basic requirements of the course.
- **P** Pass. Work that is of good quality and clearly satisfies all the basic requirements of the course.
- **P-** Work that satisfies most of the basic requirements of the course, but is deficient in some minor ways.
- **U** Unsatisfactory. Work that does not satisfy the basic requirements of the course and is deficient in significant ways.
- **EX** Course exempted. (Does not affect grade point calculations.)
- **+** Pass (P- or better).

**SCHOOL OF LAW**

The two grading systems previously employed at the School of Law were revised effective September 1983. Under the letter grade systems (with numerical equivalents), the range of satisfactory grades runs from 4.3 to 2.3 as outlined in the following distribution. Below the grade of 2.3 is one level of restricted credit (R=2.2) and one level of failure (F=2.1). The letter grades and numerical equivalents are as follows:

- A+ 4.3
- A 4.0
- A- 3.7
- B+ 3.3
- B 3.0
- B- 2.7
- C+ 2.3
- R 2.2
- F 2.1

'N' is a temporary notation used in a continuing course; it is replaced with a final grade upon completion of the course series.

Students may elect to take a limited number of courses on a credit/restricted credit/no credit system (K/RK/NK). 'K' shall be awarded for work that is comparable to numerical grades 4.3 to 2.3, 'RK' for R-level work (2.2), and 'NK' for F-level work (2.1). A limited number of courses are offered on a mandatory credit (KM)/no credit basis.

**SCHOOL OF MEDICINE**

The following grades are used in reporting on the performance of students in the M.D. program:

- **Pass** Indicates that the student has demonstrated to the satisfaction of the department or teaching group responsible for the course that he or she has mastered the material taught in the course.
- **Fail** Indicates that the student has not demonstrated to the satisfaction of the department or teaching group responsible for the course that he or she has mastered the material taught in the course.
- **Incomplete** Indicates that extenuating medical or personal circumstances have prevented the student from completing the course requirements. This grade shall be given when requested by the student with the prior approval of the Dean for Student Affairs in the School of Medicine.
- **Exempt** Indicates a course that is exempted by examination. No units are awarded for courses completed.

A "Fail" grade can be cleared by repeating and passing the particular course or by other arrangement prescribed by the department or teaching group. An "Incomplete" grade can be made up in a manner specified by the department or teaching group within a reasonable time; if the deficiency is not made up within the agreed-upon time, the "Incomplete" grade becomes a "Fail" grade. The opportunity to clear a "Fail" grade or an "Incomplete" grade cannot be extended to individuals who are not registered or eligible to register as students in the M.D. program.

**GUIDELINES FOR STUDENT ACADEMIC GRIEVANCE PROCEDURES**

The following grievance procedure is also set forth on-line as part of the Portfolio collection. Any undergraduate or graduate Stanford student who believes that he or she has been treated improperly on an academic matter is entitled to an independent review of the alleged offense, followed by corrective action if appropriate.

Grievance procedures apply only in those cases involving a perceived academic impropriety arising from an action taken by (1) an individual instructor, (2) a school or department, (3) a committee charged to administer academic policies of a particular school or department, or (4) a Senate committee or subcommittee charged to administer academic policies of the Senate of the Academic Council. They do not pertain to complaints expressing dissatisfaction with a University policy of general application to all students, nor do they...
Students should be aware that the University Ombudsperson’s office is available to all members of the Stanford community to discuss and advise on any troublesome matter of University concern and frequently helps expedite resolution of such matters. Although it has no decision-making authority, the Ombudsperson’s Office has wide powers of inquiry, including investigating student complaints against instructors.

Students also should be aware that in certain cases, the Stanford Judicial Council procedures may be more appropriate than grievance procedures. The Legislative and Judicial Charter Article II.A2(b) stipulates that a student may file a complaint with the Stanford Judicial Council alleging that a faculty member has taken unilateral disciplinary action against that student without adjudication under the judicial system. A student using this method would have the burden of proving beyond a reasonable doubt that the faculty member did in fact take unilateral disciplinary action against the complainant.

The review of a grievance or appeal undertaken by the grievance officer(s) normally shall be limited to the following considerations: (1) Were the proper facts and criteria brought to bear on the decision or, conversely, were improper or extraneous criteria brought to bear on the decision? (2) Were there any procedural irregularities that substantially affected the outcome? (3) Given proper facts, criteria, and procedure, was the decision a reasonable one?

Any University officer who receives a grievance or appeal under these guidelines may delegate the attendant duties, in whole or in part, and the guidelines apply in the same terms to such designees. The individual who hears the grievance or appeal is accordingly referred to in the procedures as the “grievance officer” or the “grievance appeal officer.”

The grievance procedures are as follows:

1. The student first should discuss the perceived offense, orally or in writing, with the individual(s) most directly responsible. If no resolution results, the student should then consult with the individual at the next administrative level, that is, the chair of the relevant department or program or, for those cases in which there is none, with the school dean. At this stage, the department or program chair, if any, shall inform the dean that the consultation is taking place and shall solicit his or her advice on how to ensure that adequate steps are taken to achieve a fair result. Every effort should be made to resolve the issues at an informal level without the complaint escalating to the status of a formal grievance.

2. If informal means of resolution prove inadequate, the student should set forth, in writing, the substance of the alleged offense, the grounds on which the student is basing the complaint, and the efforts taken to date to resolve the matter. It is at this point that the complaint becomes a formal grievance.

The document should be submitted to the dean of the school in which the grievance arose. A grievance should be filed in a timely fashion, that is, normally within 30 days of the end of the academic quarter in which the alleged offense occurred or should reasonably have been discovered.

The grievance officer (that is, the cognizant dean or his or her designee) shall promptly initiate an independent investigation and prepare a report; this shall normally be completed within 30 days.

In undertaking the investigation, the grievance officer may request a written response to the issues raised in the grievance from any individuals believed to have information the investigator considers relevant, including faculty, staff, and students. Both parties to the grievance are given an opportunity to comment in writing on the responses.

In the case of a grievance arising out of the actions of a department or program, a department or program committee, or an individual instructor in an academic department or program, the dean may, at his or her discretion, delegate the investigative function to the department or program chair. Otherwise, the dean shall obtain a report from the department or program chair describing all steps taken at the informal level and stating the facts as they appeared to the chair as a result of those steps; in this case, the report shall normally be required within two weeks of the filing of the grievance in order to permit such additional investigation as may be appropriate to be carried out in a timely manner. In either event, the dean, rather than the chair, is responsible for ensuring the adequacy of the investigation, drawing conclusions, and making the actual decision.

Upon completion of the investigation, the grievance officer will prepare and transmit to the student, and to the party against whom the grievance is directed, written findings and a proposed disposition. This decision shall become final and shall be implemented, unless there is an appeal as described in parts (3) and (4) below.

A copy of the report, along with a full record of the complaint and other relevant documentation, shall be maintained by the department, program, and school, if any, for five years.

3. If the grievant or the party against whom the grievance was lodged disagrees with the recommendations of the grievance officer at the
UNIVERSITY GOVERNANCE
AND ORGANIZATION

DIRECTORY

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William A. Halter, Office of Management and Budget, Room 356, Old Executive Office Building, Washington, D.C. 20503
Mernoy E. Harrison, California State University, Sacramento, 6000 J Street, Sacramento, CA 95819-6038
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Chien Lee, 1401 C Caroline Centre, 28 Yun Ping Road, Hong Kong, China
John M. Lillie, 66 Atherton Avenue, Atherton, CA 94207

Henry Muller, Time Inc., 1271 Avenue of the Americas, New York, NY 10020
Luis G. Nogales, Nogales Partners, 1925 Century Park East, Suite 830, Los Angeles, CA 90067-1703
Charles J. Ogletree, Harvard Law School, 320 Hauser Hall, Cambridge, MA 02138
Denise M. O'Leary, 125 South Grand Avenue, #600, Pasadena, CA 91105
Charles R. Schwab, The Charles Schwab Corporation, 101 Montgomery Street, 28th Floor, San Francisco, CA 94104-4122
Isaac Stein, Waverley Associates, 525 University Avenue, #700, Palo Alto, CA 94301
James R. Ukropina, O'Melveny & Myers, 400 South Hope Street, Suite 1060, Los Angeles, CA 90071
Ward W. Woods, Jr., Bessemer Securities Corporation, 630 Fifth Avenue, New York, NY 10111-0100

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decanal level, either on substantive or on procedural grounds, he or she may appeal in writing to the Provost.

The document must specify the particular substantive or procedural bases of the appeal (that is, the appeal must be made on grounds other than general dissatisfaction with the recommended disposition) and must be directed only to issues raised in the grievance as filed or to procedural errors in the grievance process itself, and not to new issues. The appeal should normally be submitted no more than 30 days after receipt of the grievance officer’s report.

Upon receipt of the appeal, the grievance appeal officer appointed by the Provost shall undertake a timely independent review of the issues properly raised in the appeal, normally to be completed within 30 days, and shall then issue to all appropriate parties written findings and dispositive recommendations, which will be final and binding on the parties to the grievance.

4. The student or party against whom the grievance was lodged may write to the President of the University giving reasons why he or she believes the grievance result to be wrong. No more than 30 days should elapse between receipt of the appeal recommendations and the written statement to the President urging further appeal. In any case, the President may agree or decline to entertain this further appeal.
Unless otherwise specified, courses numbered from 1 through 99 are primarily for first- and second-year undergraduates; courses numbered from 100 through 199 are for third- and fourth-year undergraduates; and those from 200 through 499 are for graduate students.

Amendments to course offerings announced in the Stanford Bulletin are found in the Time Schedule, issued quarterly.

Starting Autumn Quarter 1996, a new set of undergraduate degree requirements went into effect. In this edition of the Stanford Bulletin, a special notation follows each course description if the course can fulfill a requirement under the 1996 set of General Education Requirements or under the set of Distribution Requirements in effect Autumn 1991 through the end of the 1995 academic year. The 1991 set of requirements are designated within parentheses. Thus a course marked GER:2a may be used only towards the Natural Sciences sub-area within Area 2 of the new General Education Requirements. A course marked (DR:5) may be used only towards the Area 5: Natural Sciences requirement under the older 1991 set of Distribution Requirements. A course marked GER:2a (DR:5) has been approved to fulfill either requirement.

The Appendix of this bulletin presents a comprehensive list of courses certified as fulfilling a requirement under the 1996 system of General Education Requirements or the 1991 Distribution Requirements system.

Undergraduates fulfilling requirement sets in effect prior to 1991 should consult the Registrar's Undergraduate Degree Coordinator for information about whether a course may be applied to the requirement set applicable to them. Graduate students should ignore the various markings since such requirements do not apply to them.

SUMMER SESSION

Summer session courses are eight weeks in length, except in certain departments that offer ten-week courses.

This bulletin includes, for the Summer Session, only those courses that can be tentatively scheduled at publication time by each department. For the complete list of courses and faculty, please refer to the Stanford University bulletin, Summer Session Catalogue, 1998 issued in January.

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Assistant Dean: Jeffrey H. Moore

Professor (Teaching): George G. C. Parker
Senior Lecturers: Constance E. Bagley, David L. Bradford, Kirk O. Hanson
Lecturers: Christopher J. Canellos, Lorna R. Catford, Jeffrey T. Chambers, John W. Glyn, Jr., Robert E. Grady, Andrew S. Grove, Ward A. Hanson, David H. Hosley, Mary Ann Huckabay, Franklin P. Johnson, Allan W. Kleidon, Deborah J. Mitchell, John P. Morgridge, Lawrence G. Mohr, Jr., Jeffrey H. Moore, Joel C. Peterson, Dennis M. Rohan, Peter Wendell
Consulting Professor: H. Irving Grousbeck
Visiting Professors: Henri-Claude de Bettignies, James A. Cash, Jr.
Visiting Associate Professor: Erik Brynjolfsson
Visiting Assistant Professors: Christina L. Brown, David Epstein, Harris Sonndak

The Graduate School of Business provides graduate education for careers in management, research, and teaching.

The two-year Master of Business Administration (M.B.A.) degree program is designed for the student preparing for a general management career. No specific undergraduate major or courses are required for admission although prospective applicants are encouraged to have two or more years of managerial experience and to include some mathematics and economics in their undergraduate programs. Curricular options within the M.B.A. program include a certificate in Public Management or Global Management, the joint J.D./M.B.A. degree, and dual master's degrees in business and engineering.

The Stanford Sloan Program is an intensive one-year course of study for middle management executives leading to the degree of Master of Science in Management. Participants must be sponsored by their company and have demonstrated superior achievement.

Those interested in college teaching and research are served by the Doctor of Philosophy program.

For detailed information on programs, curricula, and faculty, write to the Graduate School of Business, Stanford University, Stanford, California 94305-5015 for the current bulletin.
Dean: Franklin M. Orr, Jr.

The School of Earth Sciences includes the Departments of Geological and Environmental Sciences, Geophysics, and Petroleum Engineering. The interschool Earth Systems Program offers study of the geological and biological processes that operate on global scales and how they interact with international environmental issues and policies. An honors program in Environmental Science, Technology, and Policy is also available through the Institute for International Studies.

The aims of the school are (1) to prepare students for careers in the fields of geology, environmental studies, engineering geology, geochemistry, geomechanics, geophysics, geostatistics, hydrogeology, petroleum engineering, and petroleum geology; (2) to conduct research in the Earth sciences; and (3) to provide opportunities for Stanford undergraduates to learn about our planet's history, to understand the natural energy and resource base that underlies our economy, and to appreciate the geological and geophysical hazards that affect human societies, as well as those factors that contribute to the quality of our environment.

To accomplish these objectives, the school offers a variety of programs adaptable to the needs of the individual student: a four-year undergraduate program leading to the degree of Bachelor of Science (B.S.); a five-year program leading to the coterminal Bachelor of Science and Master of Science (M.S.), combining degrees in Earth sciences, social sciences, physical sciences, or engineering; and a graduate program offering the degrees of Master of Science, Engineer, and Doctor of Philosophy as described below. Details of individual departmental degree programs are found in the section for each department. In addition, it is possible for an undergraduate to develop an individually designed major in the Earth Sciences.

Specific requirements for the B.S. degree are listed in each department or program section. Departmental academic advisers work with students to define a career or academic goal and assure that the student's curricular choices are appropriate to the pursuit of that goal. Advisers can help devise a sensible (and enjoyable) course of study that meets degree requirements and provides the student with opportunities to experience advanced courses, seminars, and research projects. To maximize such opportunities, students are encouraged to complete basic science and mathematics courses in high school or during their freshman year.

Each department (as well as Earth Systems) offers an honors program that involves research during the senior year. Each department also offers an academic minor for those undergraduates majoring in compatible fields.

COTERMINAL BACHELOR'S AND MASTER'S DEGREES

The Stanford coterminal degree plan enables an undergraduate to embark on an integrated program of study leading to the master's degree before requirements for the bachelor's degree have been completed. This may result in more expeditious progress towards the advanced degree than would otherwise be possible, making the program especially important to Earth scientists because the master's degree provides an excellent basis for entry into the profession. The coterminal plan permits students to be admitted to a graduate program as early as their eighth quarter at Stanford, or after earning 105 units, and no later than the eleventh quarter.

Under the plan, the student may meet the degree requirements in the more advantageous of the following two ways: by first completing the 180 units required for the B.S. degree and then completing the three quarters required for the M.S. degree; or by completing a total of 15 quarters during which the requirements for the two degrees are completed concurrently. In either case, the student has the option of receiving the B.S. degree upon meeting all the B.S. requirements or of receiving both degrees at the end of the coterminal program. Students earn degrees in the same department (including Earth Systems), in two different departments, or even in different schools; for example, a B.S. in Physics and an M.S. in Geological and Environmental Sciences. Students are encouraged to discuss the coterminal program with their advisers during their junior year. Additional information is available in the individual department offices.

UNDERGRADUATE PROGRAM

There are no special examinations or prerequisite course requirements for admission to the School of Earth Sciences. Any undergraduate student admitted to the University may declare a major in one of the Earth Science departments or the interschool Earth Systems Program by contacting the appropriate department or program office. Students interested in creating an individually designed major should visit the Dean's Office.
GRADUATE PROGRAM

Admission to the Graduate Program—A student who wishes to enroll for graduate work in the school must be qualified for graduate standing in the University and in addition must be accepted by one of the school’s three departments. One requirement for admission is submission of scores on the verbal and quantitative sections of the Graduate Record Exam. Admission to one department of the school does not guarantee admission to other departments.

Faculty Adviser—Upon entering a graduate program, the student should report to the head of the department who will arrange with a member of the faculty to act as the student’s adviser. The student, in consultation with the adviser, then arranges a course of study for the first quarter and ultimately develops a complete plan of study for the degree sought.

Financial Aid—Detailed information on scholarships, fellowships, and research grants is available from the school’s individual departments. Applications should be filed by the various dates listed in the application packet for awards that become effective in Autumn Quarter of the following academic year.

The Earth Systems Program (ESys) was conceived to meet new teaching and research needs at Stanford, and is approved as an undergraduate major. This decade is witnessing a mandate to understand how the environment functions on global and regional scales and what the role of humans is in shaping the planet’s destiny. Earth Systems refers to the geological, biological, and social processes on the planet taking place today, and those that have occurred in the past. Understanding these processes is interesting in and of itself, but it also contributes to designing effective environmental policy and to reconciling competing environmental and social objectives.

Earth Systems has coalesced as a discipline from activities in more than six departments spread across three schools in the University. The Earth Systems Program coordinates an undergraduate major with courses from traditional departments together with courses it has originated. Its course offerings are aided by the Goldman Honors Program in the Institute of International Studies. Earth Systems also hosts faculty from traditional subjects such as climatology, meteorology, oceanography, and remote sensing that in a larger university might be found in separate departments, but that are perhaps best carried out in a more integrated academic context.

The central principle of the undergraduate major is that a career in Earth Systems springs from a perspective that synthesizes the many components involved in how the earth functions, followed by a coherent focus in one of five Earth Systems specialties. Education in these specialties is accomplished with defined tracks of intermediate courses, followed by advanced electives. Each track concludes with an internship that provides an opportunity for research and work experience, or an internship with a government, conservation, or other appropriate agency. The electives and internship must be approved by an Earth Systems adviser.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

The B.S. in Earth Systems (ESys) requires the completion of at least 93 units that can be divided into three levels of courses. The student must complete a series of courses comprising a broad base specialized study and must complete five required and three elective courses in that track. Finally, the student must carry out a senior-level research or internship project.
REQUIRED CORE COURSES

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESys 10. Introduction to Earth Systems</td>
<td>3</td>
</tr>
<tr>
<td>or Civ. &amp; Envir. Engr. 170. Introduction to Environmental Science and Technology*</td>
<td>3</td>
</tr>
<tr>
<td>ESys 110. Geosphere</td>
<td>3</td>
</tr>
<tr>
<td>ESys 111. Biosphere</td>
<td>3</td>
</tr>
<tr>
<td>ESys 112. Anthrosphere</td>
<td>5</td>
</tr>
<tr>
<td>ESys 210. Senior Seminar</td>
<td>3</td>
</tr>
<tr>
<td>ESys 260. Internship</td>
<td>9</td>
</tr>
</tbody>
</table>

* Civ. & Envir. Engr. 170 is required for majors in the Energy Science and Technology track.

REQUIRED COGNATE COURSES

Biology (any one course below):
- Biol. Sci. 31. Biochemistry, Genetics, and Molecular Biology | 5 |

Chemistry:
- Chem. 31. Chemical Principles | 3 |
- Chem. 33. Organic Chemistry† | 4 |

Geological and Environmental Sciences:
- Geol. & Envir. Sci. 1. Planet Earth | 4 |
- or Geol. & Envir. Sci. 2. Earth History | 3 |

Mathematics*:
- Math. 20. Calculus and Analytic Geometry | 3 |
- Math. 21. Calculus and Analytic Geometry | 4 |
- Math. 41. Calculus and Analytic Geometry | 5 |
- Math. 42. Calculus and Analytic Geometry | 5 |

Probability and Statistics (any one course below):
- Biol. Sci. 141. Biostatistics | 4 |
- Geol. & Envir. Sci. 160. Introduction to Statistical Methods for Earth and Environmental Sciences | 4 |
- Stat. 190. Statistics for Social Scientists | 3 |

Physics:
- Physics 41. Mechanics | 4 |
- Physics 47 Light and Heat† | 4 |
- (Additional physics cognate for Energy Track only) Physics 43. Electricity | 3 |

* Math. 43 is recommended for all tracks.
† Students may take either Physics 47 or Chem. 33; Biosphere students must take Chem. 33.

Economics:
- Econ. 1. Elementary Economics | 5 |
- Econ. 51. Economic Analysis I | 5 |

Computer Programming:
- Comp. Sci. 106. Programming Methodology | 5 |

More extensive work in mathematics and physics may be expected for those planning graduate study. Graduate study in ecology and evolutionary biology and in economics requires familiarity with differential equations, linear algebra, and stochastic processes. Graduate study in geology and geophysics may require more physics and chemistry. Check with your adviser about recommendations beyond the requirements specified above.

TRACKS

GEOSPHERE

- Geol. & Envir. Sci. 8. The Oceans: Introduction to the Marine Environment | 3 |
- Geol. & Envir. Sci. 80. Earth Materials | 5 |
- Geol. & Envir. Sci. 90. Introduction to Geochemistry | 3 |
- Geol. & Envir. Sci. 111. Structural and Engineering Geology | 3 |
- Geol. & Envir. Sci. 170. Environmental Geophysics | 4 |
- or Geophys. 190. General Geophysics | 4 |

BIOSPHERE

- Biol. Sci. 31. Biochemistry, Genetics, and Molecular Biology* | 5 |
- Biol. Sci. 32. Cell and Developmental Biology* | 5 |
- Biol. Sci. 111. Evolutionary Genetics | 4 |

One of the following:
- Biol. Sci. 124. Ecosystem Physiology | 4 |

* Human Biology 2A, 3A, and 4A can be substituted for Biol. Sci. 31, 32, and 33.

ANTHROSPHERE*

- Econ. 52. Economic Analysis II | 5 |
- Econ. 118. Economics of Development | 5 |
- Econ. 150. Economics and Public Policy | 5 |

* See Earth Systems staff for additional required track course in Anthrosphere.

LAND SYSTEMS MANAGEMENT

- Geol. & Envir. Sci. 130. Environmental Earth Sciences I | 5 |
- Geol. & Envir. Sci. 131. Environmental Earth Sciences II | 5 |
- Geol. & Envir. Sci. 132. Environmental Earth Sciences III | 5 |
- Geol. & Envir. Sci. 140. Geomorphology | 3 |
- or Civ. & Envir. Engr. 162. Hydrology and Water Resources | 4 |

ENERGY SCIENCE AND TECHNOLOGY

- Engr. 30. Engineering Thermodynamics | 3 |
- ESys 120. Energy Economics | 3 |
- Pet. Engr. 103. Energy Resources | 3 |
- Pet. Engr. 120. Fundamentals of Petroleum Engineering | 3 |
- Civ. & Envir. Engr. 176A. Energy Efficient Buildings | 4 |
- Civ. & Envir. Engr. 176B. Electric Power: Generation and Conservation | 4 |

UPPER-DIVISION ELECTIVES

Three intermediate to advanced courses consistent with the primary track are required of all
majors and are to be selected with the advice and consent of the adviser. Eligible upper-division electives are listed below. Additional courses may be selected; see the program office for most current list.

GEOSPHERE TRACK
Geol. & Envir. Sci. 112. Structural and Engineering Geology II 3
Geol. & Envir. Sci. 151. Sedimentary Geology and Petrography Depositional Systems 4
Geol. & Envir. Sci. 170. Environmental Geochemistry 4
Geol. & Envir. Sci. 185. Volcanology 3
Pet. Engr. 103. Energy Resources 3

BIOSPHERE TRACK
Biol. Sci. 125. Ecosystems of California 3-4
Biol. Sci. 264H. Marine Botany 4
Geol. & Envir. Sci. 255. Introduction to Micropaleontology 5

ANTHROSPHERE TRACK
Anthro. 164. Ecological Anthropology 3-5
Econ. 106. The World Food Economy 5
Econ 125. Economic Development Theory at Work 5
Econ. 129. Analysis of Development Project 5
Econ. 154. Economics of Legal Rules and Institutions 5
Econ. 158. Antitrust and Regulation 5
Econ. 165. International Economics 4
Pol. Sci. 140A. Ethics of Development in a Global Environment 4

LAND SYSTEMS MANAGEMENT TRACK
Civ. & Envir. Engr. 170. Environmental Science and Technology* 3
or Civ. & Envir. Engr. 171. Environmental Planning Methods 4
Geol. & Envir. Sci. 230. Hydrogeology 5
Geophys. 170. Environmental and Geotechnical Geophysics 3
Urban Studies 110. Introduction to Urban Studies 4

* Civ. & Envir. Engr. 170 should be taken if it was not used as a core requirement.

ENERGY SCIENCE AND TECHNOLOGY TRACK
Esys 179. Energy Systems 5
Econ. 158. Antitrust and Regulation 5

SUMMARY OF COURSE REQUIREMENTS AND UNITS
Earth Systems Introduction and Core 16
Required Allied Courses 42-45
Tracks:
Geosphere 18
Biosphere 15-24
Anthroposphere 24-25
Land Systems Management 23
Energy Science and Technology 23
Upper-division electives 9-15
Senior project or internship 9
Senior seminar 3
Total units (depending on track, electives) 94-114

COTERMINAL B.S. AND M.S. DEGREES

The Stanford coterminal degree enables an undergraduate to embark on an integrated program of study leading to the master's degree before requirements for the bachelor's degree have been completed. An undergraduate majoring in Earth Systems may apply to work simultaneously toward B.S. and M.S. degrees. The M.S. degree in Earth Systems provides the student with enhanced tools to evaluate the primary literature of the discipline most closely associated with the student's track and allows an increased specialization through additional course work that may include 9 units of thesis research. Integration of earth systems concepts is furthered by participation in the master's seminar.

To apply, complete and return to the Earth Systems office an application that includes a statement of purpose; a Stanford transcript; two letters of recommendation, one of which should be from a faculty member of the program; and a list of courses that fulfill degree requirements. Students may be admitted as early as their eighth quarter at Stanford, or after earning 105 units, but no later than their eleventh quarter. Students may either (1) complete 180 units required for the B.S. degree and then complete the three quarters required for the M.S. degree, or (2) complete a total of 15 quarters during which the requirements of the degrees are fulfilled concurrently. The student has the option of receiving the B.S. degree after completing that degree's requirements or receiving two degrees concurrently at the end of the master's program.

Four levels of requirements must be fulfilled to receive an M.S. degree:
1. All requirements for the B.S. degree.
2. An enhanced set of cognate courses or equivalent.
3. Further course work (and/or thesis research), all of which should be at the 100-level or above, including 18 units at the 200-level or above, leading to further focus within the student’s track.
4. Participation in the master’s seminar.

The program consists of a minimum of 36 units of course work and/or thesis research, at least 18 of which must be at the 200-level or above. A more detailed description of the coterminus master’s degree may be obtained from the Earth Systems’ office.

The following subject areas should be mastered, if this has not already been accomplished at the B.S. level. Suggested courses are indicated, but others may be substituted with the adviser’s approval.

**Course No. and Subject**

**Differential Equations:**
Math. 130. Ordinary Differential Equations 3

**Linear Algebra:**
Math. 103. Matrix Theory and its Applications 3
or Math. 113. Linear Algebra and Matrix Theory 3

**Statistics:**
Stat. 110. Statistical Methods in Engineering and the Physical Sciences 4
or Geol. & Envir. Sci. 160. Statistical Methods for Earth and Environmental Sciences 4
or Biol. Sci. 141. Biostatistics 4

**Optimization Theory:**
Econ. 180. Mathematics for Economists 5
or Econ. 181. Optimization and Economic Analysis 5

**Ecological Systems:**
or Biol. Sci. 145. Behavioral Ecology 3

**Thermodynamics:**
Chem. 135. Physical Chemistry Principles 3
or Geol. & Envir. Sci. 171. Geochemical Thermodynamics 3
or Engr. 30. Engineering Thermodynamics 3

The student must devise a program of study that shows a level of specialization appropriate to the master’s level, as determined in consultation with the adviser. At least 18 units must be at the 200-level or above. The program should demonstrate further specialization and focus within the student’s undergraduate track.

With the adviser’s approval, 9 units may be in the form of research. This may culminate in the preparation of a master’s thesis, however a thesis is not required for the degree. Master’s students must take part in the Winter Quarter master’s seminar (ESys 290) and have additional responsibilities appropriate to the master’s level (thesis presentation, modeling problems, and so on), 2 units.

**TRACKS**

**GEOSPHERE**

The following foci are suggested areas of study.

**Course No. and Subject**

**Geochemistry Focus**
Biol. Sci. 216. Ecosystems Ecology and Global Geochemistry
Civ. & Envir. Engr. 273. Aquatic Geochemistry
Geol. & Envir. Sci. 90. Introduction to Geochemistry
Geol. & Envir. Sci. 170. Environmental Geochemistry
Geol. & Envir. Sci. 171. Geochemical Thermodynamics
Geol. & Envir. Sci. 257. Introduction to Organic Chemistry

**Hydrogeology Focus**
Civ. & Envir. Engr. 162. Hydrology and Water Resources
Civ. & Envir. Engr. 169. Environmental and Water Studies: Design
Civ. & Envir. Engr. 270. Movement, Fate, and Effects of Contaminants in Surface Waters and Groundwater
Geol. & Envir. Sci. 133. Introduction to Assessment of Environmental Risk
Geol. & Envir. Sci. 140. Geomorphology
Geol. & Envir. Sci. 170. Environmental Geochemistry
Geol. & Envir. Sci. 231. Contaminant Hydrogeology
Geol. & Envir. Sci. 238. Soil Physics

**Engineering Geology/Remote Sensing Focus**
Geol. & Envir. Sci. 112. Mapping the Geological Environment
Geol. & Envir. Sci. 133. Introduction to Assessment of Environmental Risk
Geol. & Envir. Sci. 140. Geomorphology
Geol. & Envir. Sci. 215. Advanced Structural Geology and Rock Mechanics
Geol. & Envir. Sci. 295. Integrating Remote Sensing and Geographic Information Systems
Geol. & Envir. Sci. 296. Introduction to GIS: ARC/INFO and Intergraph
Geophy. 40. The Earth from Space: Introduction to Remote Sensing
Geophy. 170. Environmental and Geotechnical Geophysics

**BIOSPHERE**

**Recommended Courses:**
Biol. Sci. 118. Genetics Analysis of Biological Processes
Biol. Sci. 120. General Botany
Biol. Sci. 124. Ecosystem Physiology
Biol. Sci. 125. Ecosystems of California
Biol. Sci. 137. Plant Genetics
Biol. Sci. 139. Biology of Birds
Biol. Sci. 144. Conservation Biology
Biol. Sci. 156. Plant Physiology
Biol. Sci. 228. Advanced Plant Systems
Biol. Sci. 263H. Oceanic Biology
Biol. Sci. 283. Theoretical Population Genetics
anthro... and biological processes interact over time scales from 4.5 billion years to the nearly instantaneous. Topics: the origin and evolution of the atmosphere and oceans, heat flow and global tectonics and how they have changed over time, geochemical cycles, climate change, catastrophic impacts, and the roles played by organisms. Prerequisite: Geological and Environmental Sciences 1 or 2.

3 units, Aut (Stebbins, McWilliams)

111. Biosphere—(Same as Biological Sciences 117.) Biological causes and consequences of anthropogenic and natural changes in the atmosphere, oceans, and terrestrial and freshwater ecosystems. Topics: glacial cycles and marine circulation, greenhouse gases and climate change, tropical deforestation and species extinctions, and human population growth and resource use. Prerequisites: Biology or Human Biology core or graduate standing in any department.

3 units, Win (Vitousek, Mooney)

112. Anthrosphere: Human Interactions with the Earth and Environment—(Same as Economics 155.) Analysis of economic sources of environmental problems in a market economy and evaluation of alternative policies (regulation, taxation, marketable permits) for dealing with these problems. Regional issues (local air and water pollution, traffic congestion) and global issues (climate change, stratospheric ozone depletion). Economics of natural resource management and protection, emphasizing renewable resources; connections between population growth and the environment. Prerequisite: Economics 51.

5 units, Spr (Goulder)

120. Energy Economics and Policy—For majors and students in economics and public policy. The application of neoclassical economical theory under uncertainty, modern finance theory, and risk analysis to energy issues. General and partial equilibrium analyses comparisons and how efficiency and equity, including the rights of future generations, can be incorporated into these analyses. How energy production and allocation decisions contribute to economic growth and environmental externalities and how modeling can aid energy policy creation and evaluation. Prerequisite: Economics 51.

3 units, Spr (Rothwell)

125. Climates through Time—For non-majors and prospective earth systems and environmental and geological sciences majors. Introduction to the nature of climate change over the Earth's history, particularly the past two million years, and methods of assessing past climate change. Lectures and student presentations.

3 units (J. Kennedy) not given 1997-98
169/269. The Scientific, Economic, and Political Issues of Radioactive Waste—(Graduate students register for 269.) Seminar on the scientific, economic, and political issues associated with the production and disposal of high- and low-level radioactive waste, focusing on scientific and economic issues. Class formulates answers to important questions which enter the political arena (the balance between risks and rewards to society). Enrollment limited to 15.

2 units, Spr (McWilliams)


2-3 units, Aut (Thompson)

179. Energy Systems: Achieving Energy Efficiency in the Real World—How are energy conservation and efficiency decisions made in the "real world?" Many opportunities for energy efficiency are not exploited, even when cost effective. Topics: fundamentals of energy and economic efficiency; energy efficient and alternative energy technologies and applications; incentives and obstacles to implementation. Students study and design an energy efficiency or alternate energy systems project. Prerequisites: Earth Systems 10 or Civil Engineering 170, and Economics 51, or consent of instructor.

3 units (Schneider) not given 1997-98

210. Senior Seminar in Earth Systems—Focuses on communication skills, oral and written. Each student presents results of the Earth Systems internship in an oral presentation and leads a follow-up round table discussion subsequent to talk. Participation in group project analyzing local environmental problems requiring an Earth Systems approach. Participation in peer-reviews of internship papers as required. (WIM)

3 units, Aut, Win (J. Kennedy)

250. Directed Research—Independent research into an aspect of earth systems related to the student's primary track, carried out after the junior year, during the summer, and/or during the senior year. Student develops own project with faculty supervision, or can see adviser for research ideas. 10-15 page thesis required.

9 units, quarter by arrangement (Staff)

260. Internship—Supervised field, lab, private sector or advocacy project, normally through an internship sponsored by government agencies, research institutions or other organizations, or independently developed by the student with the approval of the Academic Coordinator. Provides hands-on experience within the student's primary track. 10-15 page report required.

9 units, quarter by arrangement (J. Kennedy)

290. Master's Seminar—Open for Earth Systems master's students only. Focus is on critical examination and discussion of advanced topics in Earth Systems. Requires independent research, oral presentation of results, and preparation of an original proposal for innovative Earth Systems science/policy research.

2 units, Win (J. Kennedy)

298. Advanced Topics in Earth Systems—Open to Earth Systems master's students only. Continuation of Winter Quarter master's seminar.

2 units, Spr (J. Kennedy)

299. M.S. Thesis—Research in connection with the master's paper.

1-9 units, any quarter (Staff)

GEOLOGICAL AND ENVIRONMENTAL SCIENCES

Emeriti: (Professors) Robert Coleman, Konrad B. Krauskopf**, Ronald J. P. Lyon***, George A. Parks***, Irwin Remson
Chair: Gail A. Mahood
Associate Chair: Stephan A. Graham
Associate Professors: Dennis K. Bird, Keith Loague, Michael O. McWilliams†
Assistant Professor: Trevor Ireland
Professors (Research): Atilla Aydin, J. Michael Moldowan
Courtey Professors: Peter Brewer, David Clague, James O. Leckie
Courtey Associate Professors: Simon Klemperer, Debra Stakes
Courtey Assistant Professor: Daniel Orange
Senior Lecturer: George Mader
Consulting Professors: Richard Bernknopf, Paul Hsieh
Consulting Associate Professors: Joseph W. Ruetz, Joseph Wooden

* Joint appointment with Statistics
† Joint appointment with Geophysics
** Joint appointment with Petroleum Engineering
‡† Joint appointment with Institute for International Studies

*** Recalled to active duty
UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

The program leading to the Bachelor of Science degree in Geological and Environmental Sciences (GES) provides the background for a wide variety of careers. It prepares students for graduate studies in the earth and environmental sciences, law, business administration, land use planning, environmental engineering, public service, and other professions in which an understanding of the earth and a background in science can be important. The geological sciences are broad and include study of the earth’s history and the evolution of life; the oceans and atmosphere; the processes that shape the earth’s mountains, continents, and landscape; the chemistry and physics of earth materials and their interactions with each other and with water; and sources of water, economic minerals, metals, and fuels. Within earth sciences, the environmental sciences emphasize the present and the future, particularly the ways in which humankind is affected by natural hazards such as volcanic eruptions and earthquakes and the ways in which we affect the planet and its viability by development, contamination of natural waters, and depletion of resources.

GES offers an undergraduate major leading to the bachelor’s degree in Geological and Environmental Sciences and four formal opportunities for specialization: Geological Sciences, Environmental Sciences, Engineering Geology and Hydrogeology, and Land Resources Planning. Students whose educational objectives are within the scope of the department, but not encompassed in a predefined program, may design an independent curriculum with the help of a faculty adviser and the approval of the department chair. All successful graduates receive the Bachelor of Science in GES. Students who enroll in a predefined program likewise may have the area of specialization designated as a field on their diplomas.

The Writing in the Major (WIM) requirement may be fulfilled by taking one of the courses designated (WIM) for the larger unit total indicated. Students majoring in Geological and Environmental Sciences may fulfill the Writing in the Major requirement either by taking GES 51, or by taking at least one of the following courses: GES 110, 112, 130, 151, 152, 185, 198, 230. Students choosing to take a course for WIM credit should consult with the instructor early in the quarter; additional writing-intensive work is assigned.

GEOLOGICAL SCIENCES

The Geological Sciences curriculum leading to the B.S. degree in Geological and Environmental Sciences prepares students for professional careers and graduate studies in the earth sciences and other fields requiring an earth sciences background. The field of geological sciences is broad and involves the study of the physical and chemical processes that build continents, shape the earth’s landscape, and determine the distribution of elements in minerals, rocks, soils, and natural waters; the oceans and atmosphere; Earth’s history and the evolution of life; and materials that constitute the earth, including those of economic importance. Geological sciences is also concerned with the ways in which society is affected by natural hazards (for example, volcanic eruptions, landslides and earthquakes) and the ways in which society affects the planet (for example, the pollution of groundwater and depletion of resources).

An important emphasis of the B.S. program in the Geological Sciences curriculum is the study of earth processes and history in the natural laboratory of the field. Stanford University’s location near the Pacific continental margin, the Sierra Nevada mountain range, and the San Andreas fault system provides a nearly unparalleled setting for field studies.

The field of Geological Sciences has evolved over the last two centuries from mostly observational and descriptive into a quantitative science dealing with the chemistry and physics of the earth and other planets and with interactions between the biological and physical systems of the earth. Thus, Geological Sciences includes significant course work in chemistry, physics, and mathematics. The diversity of these requirements and experience results in graduates with versatility and a broad range of skills. Our program is designed to recognize the diversity of this field and to provide a great deal of flexibility. A significant proportion of the required courses can be selected by the student in consultation with his or her faculty adviser, allowing the B.S. program to be tailored to individual goals and interests while providing a solid background in basic earth sciences, the supporting sciences, and mathematics.

GES majors who select the Geological Sciences curriculum are expected to complete a set of courses in supporting sciences and mathematics, a core course sequence that defines the curriculum, and a set of electives chosen from the prescribed list below. Students who elect this major must also enroll in the joint San Jose State University/Stanford summer field camp (see Professor Miller). Substitutions for core courses must be approved by the adviser and the department chair. Letter grades are required, if available, in all courses.

CORE COURSE SEQUENCE

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>GES 1. Fundamentals of Geology</td>
<td>A,W,S 5</td>
</tr>
<tr>
<td>or GES 2.3. Earth History and Lab</td>
<td>A 5</td>
</tr>
<tr>
<td>GES 80. Earth Materials</td>
<td>A 5</td>
</tr>
<tr>
<td>GES 90. Introduction to Geochemistry</td>
<td>W 3</td>
</tr>
<tr>
<td>GES 102. Introduction to Field Geology</td>
<td>Sum 3</td>
</tr>
</tbody>
</table>
GES 110. Structural Geology S 5-6
or GES 111. Structural Geology and Rock Mechanics A 4
GES 112. Mapping the Geologic Environment S 3-4
GES 151. Sedimentary Geology W 4-5
GES 152. Stratigraphy and Applied Paleontology S 4-5
GES 160. Introduction to Statistical Methods for Earth and Environmental Science S 4
GES 181. Igneous and Metamorphic Processes S 3-5
Subtotal .......................................................... 38-45

REQUIRED SUPPORTING SCIENCES AND MATHEMATICS

Chem. 31. Chemical Principles A,W 4
Chem. 135. Physical Chemical Principles W 3
or Chem. 171. Physical Chemistry A 3
or GES 171. Geochemical Thermodynamics A 3

Choose one of the following groups of Mathematics courses:

Math. 20. Calculus W,S 3
Math. 21. Calculus S 4
Math. 43. Calculus W,S,Sum 5

or

Math. 41. Calculus* A 5
Math. 42. Calculus* A,W 5
Math. 43. Calculus* W,S,Sum 5

Choose one of the following groups of Physics courses:

Physics 22. Mechanics and Heat Lab A 1
Physics 23. Electricity and Optics W 3
Physics 24. Electricity and Optics Lab W 1

or

Physics 41. Mechanics† A 3
Physics 43. Electricity† W 3
Physics 45. Magnetism† S 3
Physics 46. Electricity and Magnetism Lab† S 1
Physics 47. Light and Heat† A 4
Subtotal .......................................................... 30-36

* Math. 41, 42, 43 are recommended for students planning graduate study in the sciences or engineering.
† Physics 41, 43, 45, 47 are recommended for students planning graduate study in the sciences or engineering.

ELECTIVES

Choose four courses from the following list or, with faculty approval, four related, but more advanced courses:

Biol. Sci. 117. Biology and Global Change W 3
Chem. 33. Structure and Reactivity W,S 4
Comp. Sci. 106A. Programming Methodology A,W,S 5
GES 2, 3. Earth History and Lab (if not used above) A 5
GES 8. Oceans W 3
GES 132. Environmental Earth Sciences III S 5
GES 140. Geomorphology W 3
GES 165. Geochronology S 3
GES 170. Environmental Geochemistry W 4
GES 185. Volcanology S 4-5
GES 230. Physical Hydrogeology A 5-6
Geophys. 150. Plate Tectonics S 2-3
Geophys. 183. Interpretation of Seismic Reflection Profiles W 3
Geophys. 190. General Geophysics A 3-4
Subtotal .......................................................... 11-21
Total ............................................................. 79-102

ENVIRONMENTAL SCIENCES

Environmental Sciences in the School of Earth Sciences is concerned with the combined chemical, physical, and mathematical study of the outer crust of the earth and the hydrosphere as they are found today, and of the processes and stages through which our planet’s surface has evolved. The program also deals with the impact of our use of land and natural resources, processes through which the earth may respond to this use, and the hazards these processes present to people on local and regional scales. In comparison, earth systems science focuses on some of the same topics on a global scale, and environmental engineering focuses on prevention, control, or mitigation of the negative aspects of human impact on the environment.

The Environmental Sciences curriculum provides a background in selected fundamental geological and physical sciences, basic quantitative analytical and problem-solving tools, and an introduction to the use of this background in anticipating, recognizing, and defining or diagnosing environmental problems. The primary focus is on earth sciences, the natural environment, and anthropogenic changes. Graduates should be equipped for positions in environmental consulting and remediation firms or government agencies, or, with appropriate selection of electives, for graduate study in related fields, including the geological sciences, environmental sciences or engineering, business or law, and others.

GES majors who elect the Environmental Sciences curriculum are expected to complete a core course sequence in supporting sciences and mathematics and a set of electives chosen from the prescribed list below. Substitutions for core and elective courses must be approved by the advisor and the department chair. Letter grades are required, if available, in all courses.

CORE COURSE SEQUENCE

Course No. and Subject Qtr. and Units

Civ. Engr. 170. Environmental Science and Technology A 3
GES 1. Fundamentals of Geology A,W,S 5
GES 80. Earth Materials A 5
GES 90. Introduction to Geochemistry W 3
GES 102. Introduction to Field Geology Sum 3
GES 110. Structural Geology S 5-6
or GES 111. Structural Geology and Rock Mechanics A 4
### GEOLOGICAL AND ENVIRONMENTAL SCIENCES

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>GES 112. Mapping the Geologic Environment</td>
<td>S 3-4</td>
</tr>
<tr>
<td>GES 130. Environmental Earth Sciences I</td>
<td>A 5-6</td>
</tr>
<tr>
<td>GES 131. Environmental Earth Sciences II</td>
<td>W 5</td>
</tr>
<tr>
<td>GES 151. Sedimentary Geology</td>
<td>W 4-5</td>
</tr>
<tr>
<td>GES 160. Introduction to Statistical Methods for Earth and Environmental Sciences</td>
<td>S 4</td>
</tr>
<tr>
<td>GES 170. Environmental Geochemistry</td>
<td>W 4</td>
</tr>
<tr>
<td>GES 230. Physical Hydrogeology</td>
<td>A 5-6</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>53-59</strong></td>
</tr>
</tbody>
</table>

### REQUIRED SCIENCES AND MATHEMATICS

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. 31. Chemical Principles</td>
<td>A, W 4</td>
</tr>
<tr>
<td>Chem. 33. Structure and Reactivity</td>
<td>W, S 4</td>
</tr>
<tr>
<td>Chem. 135. Physical Chemical Principles</td>
<td>W 3</td>
</tr>
<tr>
<td>or Chem. 171. Physical Chemistry</td>
<td>A 3</td>
</tr>
<tr>
<td>or GES 171. Geochemical Thermodynamics</td>
<td>A 3</td>
</tr>
</tbody>
</table>

Choose one of the following groups of mathematics courses:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. 20. Calculus</td>
<td>W,S 3</td>
</tr>
<tr>
<td>Math. 21. Calculus</td>
<td>S 4</td>
</tr>
<tr>
<td>Math. 43. Calculus</td>
<td>W,S,Sum 5</td>
</tr>
<tr>
<td>or Math. 41. Calculus</td>
<td>A 5</td>
</tr>
<tr>
<td>Math. 42. Calculus</td>
<td>A,W 5</td>
</tr>
<tr>
<td>Math. 43. Calculus*</td>
<td>W,S,Sum 5</td>
</tr>
</tbody>
</table>

Choose one of the following groups of physics courses:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 22. Mechanics and Heat Lab</td>
<td>A 1</td>
</tr>
<tr>
<td>Physics 23. Electricity and Optics</td>
<td>W 3</td>
</tr>
<tr>
<td>Physics 24. Electricity and Optics Lab</td>
<td>W 1</td>
</tr>
<tr>
<td>or Physics 41. Mechanics†</td>
<td>A 3</td>
</tr>
<tr>
<td>Physics 43. Electricity†</td>
<td>W 3</td>
</tr>
<tr>
<td>Physics 45. Magnetism†</td>
<td>S 3</td>
</tr>
<tr>
<td>Physics 46. Electricity and Magnetism Lab†</td>
<td>S 1</td>
</tr>
<tr>
<td>Physics 47. Light and Heat†</td>
<td>A 4</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>34-40</strong></td>
</tr>
</tbody>
</table>

* Math. 41, 42, 43 are recommended for students planning graduate study in the sciences or engineering.
† Physics 41, 43, 45, 47 are recommended for students planning graduate study in the sciences or engineering.

### ELECTIVES

Choose four courses from the following list or, with faculty approval, four related, but more advanced courses:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biol. Sci. 117. Biology and Global Change</td>
<td>W 3</td>
</tr>
<tr>
<td>Civ. Engr. 266. Environmental Policy Design and Implementation</td>
<td>S 4</td>
</tr>
<tr>
<td>Comp. Sci. 106A. Programming Methodology</td>
<td>A,W,S 5</td>
</tr>
<tr>
<td>Engr. 60. Engineering Economy</td>
<td>A,W 3</td>
</tr>
<tr>
<td>GES 2, 3. Earth History and Lab</td>
<td>A 5</td>
</tr>
<tr>
<td>GES 8. Oceans</td>
<td>W 3</td>
</tr>
<tr>
<td>GES 115. Engineering Geology Practice</td>
<td>S 3</td>
</tr>
<tr>
<td>GES 132. Environmental Earth Sciences III</td>
<td>S 5</td>
</tr>
<tr>
<td>GES 140. Geomorphology</td>
<td>W 3</td>
</tr>
<tr>
<td>GES 171. Geochemical Thermodynamics (if not used above)</td>
<td>A 3</td>
</tr>
<tr>
<td>GES 185. Volcanology</td>
<td>S 4-5</td>
</tr>
</tbody>
</table>

### Geophys. 170. Environmental and Geotechnical Geophysics | S 3 |
### Hum. Bio. 148. Environmental Policy | S 3 |
### Pet. Engr. 103. Energy Resources A,S 3 |

**Subtotal** ........................................................................................................................................... **12-20**
**Total** ................................................................................................................................................... **99-119**

### ENGINEERING GEOLOGY AND HYDROGEOLOGY

The Engineering Geology and Hydrogeology curriculum is intended for undergraduate students interested in the application of geological and engineering data and principles to the study of rock, soil, and water to recognize and interpret geological and environmental factors affecting engineering structures and groundwater resources. Students learn to characterize and assess the risks associated with natural geological hazards such as landslides and earthquakes and with groundwater flow and contamination. The curriculum prepares students for graduate programs and professional careers in engineering and environmental geology, hydrogeology, geotechnical engineering, and geology. Students interested in this major track should contact faculty advisers Professors Pollard, Loague, or Gorelick.

GES majors who elect the Engineering Geology and Hydrogeology curriculum are expected to complete a core course sequence and a set of courses in supporting sciences and mathematics. The core courses come from two areas: Earth Sciences and Engineering. Any substitutions for core courses must be approved by the faculty adviser and the department chair. In addition, four elective courses, consistent with the core curriculum and required of all majors are to be selected with the advice and consent of the adviser. Typically, electives are selected from the list below. Letter grades are required, if available, in all courses.

### CORE COURSES

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>GES 1. Fundamentals of Geology</td>
<td>A,W,S 5</td>
</tr>
<tr>
<td>GES 80. Earth Materials</td>
<td>A 5</td>
</tr>
<tr>
<td>GES 102. Introduction to Field Geology</td>
<td>Sum 3</td>
</tr>
<tr>
<td>GES 111. Structural Geology and Rock Mechanics</td>
<td>A 4</td>
</tr>
<tr>
<td>GES 112. Mapping the Geologic Environment</td>
<td>S 3-4</td>
</tr>
<tr>
<td>GES 115. Engineering Geology Practice</td>
<td>S 3</td>
</tr>
<tr>
<td>GES 160. Introduction to Statistical Methods for Earth and Environmental Sciences</td>
<td>S 4</td>
</tr>
<tr>
<td>GES 195. Integrating Remote Sensing and GIS</td>
<td>A 3</td>
</tr>
<tr>
<td>GES 230. Physical Hydrogeology</td>
<td>A 5-6</td>
</tr>
<tr>
<td>Geophys. 170. Environmental and Geotechnical Geophysics</td>
<td>S 3</td>
</tr>
<tr>
<td>Earth Science Subtotal</td>
<td>38-40</td>
</tr>
<tr>
<td>Civ. Engr. 101A. Structural Systems</td>
<td>W 4</td>
</tr>
<tr>
<td>Civ. Engr. 101B. Mechanics of Fluids</td>
<td>S 4</td>
</tr>
<tr>
<td>Civ. Engr. 101C. Geotechnical Engineering</td>
<td>A 4</td>
</tr>
</tbody>
</table>
Comp. Sci. 106A. Programming A,W,S 5
Engineering Subtotal 22

REQUIRED SUPPORTING SCIENCES AND MATHEMATICS
Chem. 31. Chemistry Principles A,W 4
Math. 41. Calculus A 5
Math. 42. Calculus A,W 5
Math. 43. Calculus W,S,Sum 5
Math. 44. Calculus A,S 3
Math. 130. Ordinary and Differential Equations A,W,S,Sum 3
or Mech. Engr. 100. Differential Equations in Engineering S 3
Physics 41. Mechanics W 4
Subtotal 29

SUGGESTED ELECTIVES
Choose four courses from the following list or, with faculty approval, four related courses:

Group A
Civ. Engr. 170. Environmental Science and Technology A 3
Civ. Engr. 180A. Introduction to Structural Analysis A,S 3
Civ. Engr. 180B. Structural Analysis A 4
Civ. Engr. 270. Movement, Fate, and Effects of Contaminants in Surface Waters and Groundwater A 3
Civ. Engr. 291. Foundation Engineering W 3
Civ. Engr. 293. Experimental Soil Mechanics W 2
Engr. 30. Engineering Thermodynamics A,W 3
Engr. 50. Introductory Science of Materials W, S 3
GES 130. Environmental Earth Sciences I A 5-6
GES 131. Environmental Earth Sciences II W 5
GES 132. Environmental Earth Sciences III S 5
GES 140. Geomorphology W 3
GES 216. Rock Fracture Mechanics S 3-4
GES 217. Characterization and Hydraulics of Rock Fracture W 3
GES 231. Contaminant Hydrogeology S 4
GES 235. Role of Fluids in Geologic Processes S 3
GES 237. Surface and Near-Surface Hydrologic Response W 4
Geophys. 190. General Geophysics A 4
Mech. Engr. 111. Stress, Strain, and Strength A 3
Subtotal 12-20
Total 101-111

LAND RESOURCES PLANNING
The Land Resources curriculum is intended for students who anticipate graduate study and careers in city or regional planning, conservation, landscape architecture, environmental law, land resource management, and allied fields. The program is flexible and provides ample opportunity for expansion in scope or depth to accommodate the demands of an anticipated career or an individual's interests. Students planning graduate study in the sciences or engineering should select one of the other GES programs.

GES majors in the Land Resources Planning curriculum are expected to complete a set of courses in supporting sciences and mathematics, a core course sequence, and several electives chosen from prescribed groups listed below. Course substitutions must be approved by the adviser and the department chair. Letter grades are required, if available, in all courses.

CORE COURSES
Civ. Engr. 170. Environmental Science and Technology A 3
Comp. Sci. 105A. Introduction to Computers A,S 5
or Comp. Sci. 106A. Programming Methodology A,W,S 5
Econ. 1. Elementary Economics A,W,S 5
GES 1. Fundamentals of Geology A,W,S 5
or GES 2,3. Earth History and Lab A 5
GES 8. Oceans W 3
GES 80. Earth Materials A 5
GES 102. Introduction to Field Geology Sum 3
GES 112. Mapping the Geologic Environment S 3-4
GES 130. Environmental Earth Sciences I A 5-6
GES 131. Environmental Earth Sciences II W 5
GES 132. Environmental Earth Sciences III S 5
GES 133. Introduction to Assessment of Environmental Risk W 3
GES 160. Introduction to Statistical Methods for Earth and Environmental Sciences S 4
Urban Studies 110. Introduction to Urban Studies A 4
Urban Studies 170. Introduction to Urban Design W 5
Subtotal 63-65

REQUIRED ENGINEERING, SUPPORTING SCIENCES, AND MATHEMATICS
Chem. 31. Chemical Principles A,W 4
Math. 20. Calculus W,S 3
or Math. 41. Calculus A 5
Subtotal 10-12

ELECTIVES
Choose one course from each of the following groups:

Group A
Civ. Engr. 171. Environmental Planning Methods W 3
Civ. Engr. 175. Environmental and Natural Resource Economics W 5
Engr. 60. Engineering Economy A,W 3

Group B
Geophys. 4. Natural Hazards and Human Survival A,W 3
GES 140. Geomorphology W 3
Pet. Engr. 103. Energy Resources A,S 3

Group C
Biol. Sci. 117. Biology and Global Change W 3
Econ. 106. The World Food Economy W 4
MINORS
A minor in Geological and Environmental Sciences consists of a small set of required courses plus 12 elective units.
Required courses are:
GES 1. Fundamentals of Geology
or GES 2. Earth History and GES 3. Earth History Lab
or GES 130. Environmental Earth Sciences I
GES 80. Earth Materials
GES 102. Introduction to Field Geology
or GES 112. Mapping the Geologic Environment
A minimum of 12 additional units in GES courses, including three courses from the list below:
GES 8. The Oceans
GES 90. Introduction to Geochemistry
or GES 120. Geosphere
GES 110. Structural Geology
or GES 111. Structural Geology and Rock Mechanics
GES 131. Environmental Earth Sciences II
GES 140. Geomorphology
GES 151. Sedimentary Geology and Petrography
GES 152. Stratigraphy and Applied Paleontology
GES 165. Geochronology
GES 170. Environmental Geochemistry
GES 181. Igneous and Metamorphic Processes
GES 185. Volcanology
GES 195. Measurement and Evaluation of Environment

All students pursuing a minor in GES are encouraged to take one of the sophomore seminars (courses with numbers 50-59) and to participate in the undergraduate seminar (GES 4).

Contact the GES department for further information. The variety of courses that may be used to satisfy the requirements should make it possible for students with a wide range of interests and backgrounds to complete a minor in GES.

HONORS PROGRAM
The Department of Geological and Environmental Sciences offers a program leading to the Bachelor of Science in Geological and Environmental Sciences with Honors. The program provides an opportunity for independent study and research on a topic of special interest culminating in a written report. The honors program is open to all seniors with a grade point average (GPA) of at least 3.5 in earth and environmental science courses and a minimum of 3.0 in all University course work. Modest financial support is available to help defray laboratory and field expenses incurred in conjunction with honors research. Students intending to pursue the honors program must submit an application to the department before the beginning of their senior year.

A student selects a research topic and prepares a research proposal in consultation with a faculty adviser of his or her choosing. Research undertaken for the honors program can be of a theoretical, field, or experimental nature, or a combination of these approaches.

Upon approval of the research proposal and formal entrance to the program, course credit for the honors research project and report preparation is assigned by the student's faculty adviser within the framework of GES 199; 3 units each quarter are assigned to the project for three quarters of the student's senior year for a total of 9 units.

Research undertaken for the honors program cannot be used as a substitute for regularly required courses. Both a written and an oral presentation of research results are required of honors students. A formal written report must be submitted to the student's research adviser no later than the fourth week of the student's final senior quarter. To graduate with honors, the report must be read, approved, and signed by the student's faculty adviser and a second member of the faculty. Before the end of the senior year, each honors candidate gives a public seminar on his or her research results.

COTERMINAL B.S./M.S. PROGRAM
The coterminal B.S./M.S. program offers a special opportunity for students to pursue a graduate research experience and an M.S. degree concurrently with or subsequent to their B.S. studies. The master's degree is viewed as an entrance professional degree in a number of subdisciplines within the earth sciences (for example, engineering geology, environmental geology, and so on). Alternatively, graduate course work and the master's research experience can provide an intermediate step prior to pursuit of the Ph.D. Regardless of their professional goal, coterminal B.S./M.S. students are treated as members of the graduate community and are expected to meet all of the standards set for regular M.S. students. Students should apply to the program after their seventh quarter (or after earning 105 units) but no later than their eleventh quarter. They are required to submit an application for entrance to the GES cote-
minal program including a statement of purpose, a copy of their current Stanford transcript, official Graduate Record Examination scores, letters of recommendation from two members of the Stanford faculty (one of whom must be in this department), and a list of courses in which they intend to enroll to fulfill degree requirements. Each student must complete a thesis or master’s report describing the results of his or her research. Specific research interests should be noted in the statement of purpose and discussed with a member of the GES faculty prior to submission of an application to the coterminal program.

Students must meet all requirements for both the B.S. and M.S. degrees. Students may either (1) complete 180 units required for the B.S. degree and then complete three full-time quarters for the M.S. degree, or (2) complete a total of fifteen quarters during which the requirements of the two degrees are fulfilled concurrently. The student has the option of receiving the B.S. degree upon completion of that degree’s requirements, or receiving the B.S. and M.S. degrees concurrently at the completion of the master’s program. Unit requirements for the coterminal program are a minimum of 180 units for the B.S. degree and a minimum of 36 units of course work at the 100 level or above for the M.S. degree. At least half of the courses used to satisfy the 36-unit requirement must be designated as being primarily for graduate students, normally at the 200 level or above. No more than 15 units of thesis research may be used to satisfy the 36-unit requirement. Further information about this program may be obtained from the GES office.

GRADUATE PROGRAMS

Graduate studies in the Department of Geological and Environmental Sciences (GES) involve academic course work and independent research. Students are prepared for careers as professional scientists in research or the application of the earth sciences to mineral, energy, and water resources. Programs lead to the M.S., Engineer, and Ph.D. degrees. Course programs in the areas of faculty interest are tailored to the student’s needs and interests with the aid of his or her research adviser. Students are encouraged to include in their program courses offered in other departments in the School of Earth Sciences as well as in other departments in the University. Diplomas designate degrees in Geological and Environmental Sciences and may also indicate the following specialized fields of study: Geomathematics, Geostatistics in the Earth Sciences, and Hydrogeology.

A broad range of opportunities for research is offered by the varied interests of the faculty in the department and in other departments of the School of Earth Sciences. Stanford University is in a region that invites geologic field research during all seasons of the year. The California Coast Ranges, Sierra Nevada, Cascade Mountains, Colorado Plateau, Columbia Plateau, and the Basin and Range Province are all within easy reach; their geology offers many unsolved problems in all branches of the science. Marine geological and geophysical research are pursued by several faculty and their students in a global context with special emphasis on the Pacific. Laboratories and analytical facilities are available for research in various branches of geology, including geochemistry, hydrogeology, igneous petrology, marine geology, metamorphic petrology, mineralogy, mineral deposits, mineral physics, paleontology and micropaleontology, petroleum geology, rock fracture mechanics, sedimentology, stratigraphy, structural geology, and volcanology.

The broad areas of faculty teaching and research are divided into three fields, which have diploma designation, and six areas of specialization.

Admission—For admission to graduate work in the department, the applicant must have taken the Aptitude Test (verbal, quantitative, and analytical) of the Graduate Record Examination. In keeping with University policy, applicants whose first language is not English must submit TOEFL (Test of English as a Foreign Language) scores from a test taken within the last 18 months. Previously admitted students who wish to change their degree objective from M.S. to Ph.D. must petition the GES Admissions Committee.

FIELDS WITH DIPLOMA DESIGNATION

Hydrogeology—The Hydrogeology program, which leads to an M.S., Engineer, or Ph.D. degree in GES, balances research in purely scientific and applied aspects of groundwater resources and near-surface processes. Key department faculty in hydrogeology are Professors Gorelick and Loague, but there are strong interactions with faculty in the Departments of Civil Engineering, Geophysics, and Petroleum Engineering and with scientists at the USGS. Investigations typically involve field sites and focus on topics ranging from understanding groundwater flow through large basins to optimal design of aquifer remediation strategies. The scales of interest extend from the domain of pores and fractures to vast regional flow systems. One important aim is to develop conceptual and quantitative predictive models. Such models enhance our understanding of the role of groundwater flow as a geologic process and provide means for evaluating and managing resources.

The program requires students to obtain a broad background in earth sciences and engineering. Students in the program must have a strong general scientific background in basic physics, chem-
istry, computer science, and mathematics and a demonstrated aptitude for solving quantitative problems. They must complete a core curriculum involving courses in hydrogeology, hydrology, fluid mechanics, and water quality. A list of required and recommended courses is supplied upon request.

**Geostatistics**—The Geostatistics program, which leads to an M.S. or Ph.D. degree in GES, is under the direction of Professor Journel. It focuses on the probabilistic modeling of earth sciences phenomena such as oil reservoirs, ore deposits, and pollution sites in view of their development and management. As opposed to traditional mapping algorithms, stochastic imaging provides alternative, equiprobable, very high resolution numerical models of the phenomenon under study. These models integrate data from various sources, such as well data, geophysical logs, and geological interpretation. Strong interactions have been developed with faculty and students in the Departments of Geophysics and Petroleum Engineering.

The program requires a geological background and a fair level of calculus and programming (Fortran and/or C). Recent graduates have found jobs in the extractive (mining, oil) and environmental (EPA) fields.

**Geomathematics**—The Geomathematics program, under the direction of Professor Harbaugh, leads either to an M.S. or Ph.D. degree in GES. It focuses on the use of mathematics in simulating geologic processes in petroleum-bearing sedimentary basins. Geological processes are represented in terms of their underlying physical principles by differential equations that have been placed in finite-difference form for numerical solution by computer. The numerical solutions are linked with graphics workstations to create dynamic three-dimensional displays, which are then used in simulating actual sedimentary basins.

Students in the program should have demonstrated aptitude for mathematics and computer programming. A list of required and recommended courses is supplied upon request.

**AREAS OF SPECIALIZATION**

**Geochemistry, Petrology, and Mineralogy**—The research and teaching interests of a number of the faculty in the Department of Geological and Environmental Sciences involve geochemistry and its applications in the atomic-level structure and properties of earth materials, hydrothermal systems, igneous and metamorphic petrology, cosmochemistry, biogeochemistry, mineralogy and mineral physics, mineral surface and colloid reactions, environmental geochemistry, and ore deposits. Techniques include field-oriented studies, lab experimentation at high temperatures and pressures on phase equilibria and mineral-fluid interactions, x-ray scattering and spectroscopic studies of organic and inorganic earth materials, computer prediction and modeling, electron microprobe and sensitive high-resolution ion microprobe analysis, and Ar-Ar geochronology. The scale of problems studied ranges from global to atomic. Students with strong backgrounds in chemistry are especially urged to contact faculty in these fields, including Professors Bird, Brown, Einaudi, Ernst, Ireland, Liou, Mahood, Matson, McWilliams, Moldowan, and Stebbins.

**Quantitative Structural Geology, Geomechanics, and Active Tectonics**—Research opportunities in this specialization include quantitative structural geology, active and neotectonics, engineering geology, rock fracture mechanics, aquifer and reservoir visualization and characterization, and geomechanics. Program advisers are Professors Aydin and Pollard. Correspondence with the advisers before application is suggested to clarify the nature and requirements of the program. Other faculty members with related research interests are Professors Bird, Gorelick, and Loague (from GES); Professors Marko, Nur, Segall, and Zoiback (from Geophysics); and Professors Aziz, Hewett, Journel, and Orr (from Petroleum Engineering).

One focus of the program is on modeling physical processes responsible for geological structures. Topics include the evolution of crustal structures such as faults, folds, and fractures, and natural hazards related to earthquakes and volcanoes. Another focus is on the role of geologic structures (faults, folds, fractures, and so on) in fluid flow in groundwater aquifers and petroleum reservoirs. This research is under the umbrella of the Rock Fracture Project, an industrial affiliates program.

The methodologies used in this program include field mapping of ancient or active structures, seismic mapping and interpretation of crustal subsurface structures, laboratory investigations using physical models, and theoretical analyses based on solid, fluid, and fracture mechanics. Research goals include delineating stress, strain, and displacement fields associated with geological structures at scales ranging from laboratory samples to plate boundaries, and understanding the geological and hydraulic properties of joints and faults.

**Sedimentary Geology and Paleontology**—Research in sedimentary geology at Stanford spans a wide range of specialized studies in modern and ancient settings. Sedimentary processes are studied at scales ranging from single sediment-gravity flows to the mechanisms by which continental margin basins subside. Time-dependent phenomena are investigated at levels that range from the deposition and organic geochemical and palaeoecologic signatures of annually varved sedi-
ments to that of the fill of long-lived foreland basins. Spatial venues span the globe from Asia, around the Pacific Rim to South America, and across to Africa in stratigraphic units that range from Archean to recent; these are investigated with special focus on the tectonics, sedimentation, and paleoclimate of continental margins and sedimentary basins of the western U.S. These investigations employ the tools of many subdisciplines, including computer modeling/simulation, geochemistry, geochronology, micropaleontology, paleoecology, paleomagnetism, sedimentology, and seismic interpretation, with emphasis on interdisciplinary integration. Current projects include research on the origins and evolution of sedimentary basins in Asia, sediment-gravity flow mechanisms and the structure of associated deposits, paleoclimatology and sedimentation of modern western Pacific marginal seas, evolution of modern shallow carbonate depositional systems in the Gulf of California, sequence and seismic stratigraphic architecture of active margin basins, application of sedimentology to interpreting surface conditions and crustal evolution on the Archean earth, organic geochemistry of paleoclimatic events such as El Niño, and computer simulation of sediment flows and deposits. Core faculty are Dunbar, Graham, Ingle, and Lowe; faculty with related or overlapping interests include Gorelick, Harbaugh, McWilliams, Miller, and Moldovan.

Structural Geology, Regional Geology, and Tectonics—Research in structural geology, regional geology, and tectonics overlaps the interests of many other research programs in the school and encompasses a broad spectrum of disciplines. Field-based studies address the evolution and deformation of continental crust and the relationship of plate tectonics to the genesis and evolution of mountain belts and sedimentary basins, with emphasis on the circum-Pacific region and North American Cordillera. The 40Ar/39Ar and fission track geochronology laboratories support studies aimed at understanding the thermal history of sedimentary basins and of igneous and metamorphic terranes, determining rates of geologic processes, and calibrating the geological and geomagnetic time scales. Geophysical studies include seismic imaging of the crust and mantle, stress and strain measurement in regions of active deformation, and paleomagnetic measurement of crustal deformation and continental accretion. Faculty with general interests in these topics include Professors Aydin, Ernst, Graham, McWilliams, Miller, and Pollard in Geological and Environmental Sciences, and Klemperer, Nur, Segall, Sleep, Thompson and Zoback in Geophysics.

Surface and Aqueous Geochemistry—Professors Brown and Parks (emeritus) lead the Surface and Aqueous Geochemistry Group (SAAG) in the alteration and partitioning reactions that determine the mobility, bioavailability, and ultimate fate of solutes and contaminants in natural waters. Research focuses on the fundamental physical and surface/interfacial chemistry underlying reactions among water, aqueous solutes, and minerals under earth-surface conditions, and how the composition and structure of the solutions and mineral surfaces influence them. Students study speciation or complexation, dissolution, precipitation, and especially sorption reactions using a variety of classical surface chemistry and surface-sensitive spectroscopic methods, as well as computer simulations of the macroscopic and molecular-scale behavior of solutes and properties of solute-surface complexes. Results can be used to understand mechanisms of element partitioning and cycling in geochemical systems; they have applications in a wide variety of contexts including hazardous waste management, remediation of contaminated sites, petroleum migration and recovery, and weathering under the influence of acid rain.

SAAG students are expected to accumulate a sound background in physical and inorganic chemistry as well as geochemistry, and at least one field of application such as environmental engineering, environmental geosciences, or hydrogeology. Preference is given to applicants who have a strong quantitative background in chemistry and physical chemistry and experience with computers and laboratory methods.

Volcanology—Professors Aydin, Mahood and Pollard have overlapping interests with Professor Segall in Geophysics in the physics of magma transport in the crust and the deformation and seismic signatures of volcanic activity; explosive volcanism and emplacement of pyroclastic flows; formation of dikes, magma reservoirs, and sills; geologic evolution of caldera systems; eruption triggers; magma degassing and impact of volcanic gases on the atmosphere; and planetary volcanology.

MASTER OF SCIENCE

Objectives—The purpose of the master’s program in Geological and Environmental Sciences is to continue a student’s training in one of a broad range of earth science disciplines and to prepare students for either a professional career or doctoral studies.

Procedures—The graduate coordinator of the department appoints an academic adviser during registration with appropriate consideration of the student’s background, interests, and professional goals. In consultation with the adviser, the student plans a program of course work for the first year. The student should select a thesis adviser within the first year of residence and submit to the thesis adviser a proposal for thesis research as soon
as possible. The academic adviser supervises completion of the department requirements for the M.S. program (as outlined below) until the research proposal has been accepted; responsibility then passes to the thesis adviser. The student may change either thesis or academic advisers by mutual agreement and after approval of the Graduate Coordinator.

Requirements—The University’s requirements for M.S. degrees are outlined in the “Graduate Degrees” section of this bulletin. Practical training (GES 385) may be required by some programs, with adviser approval, depending on the background of the student. Additional department requirements include the following:

1. A minimum of 36 units of course work at the 100 level or above.
   a. Half of the courses used to satisfy the 36-unit requirement must be intended as being primarily for graduate students, usually at the 200 level or above.
   b. No more than 15 units of thesis research may be used to satisfy the 36-unit requirement.
   c. Some students may be required to make up background deficiencies in addition to these basic requirements.
2. Each student must have a research adviser who is a faculty member in the department and is within the student’s thesis topic area or specialized area of study.
3. Each student must complete a thesis describing his or her research. Thesis research should begin during the first year of study at Stanford and should be completed before the end of the second year of residence.
4. Early during the thesis research period, and after consultation with the student, the thesis adviser appoints a second reader for the thesis, who must be approved by the Graduate Coordinator; the thesis adviser is the first reader. The two readers jointly determine whether the thesis is acceptable for the M.S. degree in the department.

ENGINEER DEGREE

The Engineer degree is offered as an option for students in applied disciplines who wish to obtain a graduate education extending beyond that of an M.S., yet do not have the desire to conduct the research needed to obtain a Ph.D. A minimum of two years (six quarters) of graduate study is required. The candidate must complete 72 units of course work, no more than 10 of which may be applied to overcoming deficiencies in undergraduate training. The student must prepare a substantial thesis that meets the approval of the thesis adviser and the Graduate Coordinator.

DOCTOR OF PHILOSOPHY

Objectives—The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship, high attainment in a particular field of knowledge, and the ability to conduct independent research. To this end, the objectives of the doctoral program are to enable students to develop skills needed to conduct original investigations in a particular discipline or set of disciplines in the earth sciences, to interpret the results, and to present the data and conclusions in a publishable manner.

Requirements—The University’s requirements for the Ph.D. degree are outlined in the “Graduate Degrees” section of this bulletin. Practical training (GES 385) may be required by some programs, with adviser approval, depending on the background of the student. A summary of additional department requirements is presented below:

1. Ph.D. students must complete the required courses in their individual program or in their specialized area of study with a grade point average (GPA) of ‘B’ or higher, or demonstrate that they have completed the equivalents elsewhere. Ph.D. students must complete a minimum of four letter-grade courses of at least 3 units each from four different faculty members on the Academic Council in the University. At least two of three courses must be from two different GES faculty members.
2. Each student must qualify for candidacy for the Ph.D. by the end of the sixth quarter in residence, excluding summers. Department procedures require selection of a faculty thesis adviser, preparation of a written research proposal, approval of this proposal by the thesis adviser, selection of a committee for the Ph.D. qualifying examination, and approval of the membership by the Graduate Coordinator and chair of the department. The research examination consists of three parts: oral presentation of a research proposal, examination on the research proposal, and examination on subject matter relevant to the proposed research. The exam should be scheduled for prior to May 1, so that the outcome of the exam is known at the time of the annual spring evaluation of graduate students.
3. Upon qualifying for Ph.D. candidacy, the student and thesis adviser, who must be a department faculty member, choose a Research Committee that includes a minimum of two faculty members in the University in addition to the adviser. Annually, in the month of March or April, the candidate must organize a meeting of the research committee to present a brief progress report covering the past year.
4. Under the supervision of the Research Advisory Committee, the candidate must prepare a doctoral dissertation that is a contribution to knowledge and is the result of independent research. The format of the dissertation must meet University guidelines. The student is strongly urged to prepare dissertation chapters that, in scientific content and format, are readily publishable.

5. The doctoral dissertation is defended in the University oral examination. The department appoints the research adviser and two other members of the Research Committee to be readers of the draft dissertation. The readers are charged to read the draft and to certify in writing to the department that it is adequate to serve as a basis for the University oral examination. Upon obtaining this written certification, the student is permitted to schedule the University oral examination.

Ph.D. MINOR

Candidates for the Ph.D. degree in other departments who wish to obtain a minor in Geological and Environmental Sciences must complete, with an GPA of 'B' or better, 20 units in the geosciences in lecture courses intended for graduate students. The selection of courses must be approved by the student’s GES adviser and the department chair.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

(AU) indicates that the course is subject to the University Activity Unit limitations (8 units maximum).

UNDERGRADUATE

1. Fundamentals of Geology—For non-majors or prospective majors in Earth Systems or Geological and Environmental Sciences. Introduction to and survey of the processes, past and present, that shape the earth’s land forms, produce the minerals and rocks that comprise the earth, create soils, deform the earth’s crust, and move continents. Ways in which man interacts with the earth, constructively and destructively. Surficial processes involving water, water’s role in erosion and in the production of sediment. Processes acting within the earth’s interior, emphasizing global tectonics. Geologic hazards: earthquakes, volcanic eruptions, flooding, and landslides, and their mitigation. Nonrenewable resources, energy, and environmental problems. Lectures, assignments, one all-day field trip, and one weekly three-hour lab. Recommended: high school chemistry and physics. GER:2a (DR:5)

5 units, Aut (Einaudi)
Win (Bird)
Spr (McWilliams)

2. Earth History—For non-majors or prospective Earth Systems or geology majors. The earth is a dynamic planet, its surface continuously remolded by changing patterns of plate movements, climatic variation, the rise and fall of sea level, mountain building, volcanism, erosion, and sedimentation. It has hosted an evolution of organisms, from self-replicating molecules to man, that have interacted with and strongly modified surrounding environments. The evolution of the earth and its biosphere, hydrosphere, and atmosphere represent active areas of current research and discussion. Topics: the formation of the earth, origin of life, evolution of the continents, oxygenation of the atmosphere, development of metazoans, history of glaciations and climate, the role of extraterrestrial events in geological and biological evolution. Lab in GES 3 examines the materials and organisms discussed. Majors in geology must take 3 concurrently or in a subsequent year. $10 field trip fee required. GER:2a (DR:5)

3 units, Aut (Lowe)

3. Earth History Laboratory—Introduction to the methods and materials of historical geology. Lab sessions on stratigraphic interpretation, geologic maps and cross sections, sedimentary environments, and metazoan evolution and fossils. Recommended for students taking GES 2; required for geology majors who took Geology 2 in 1985-86 or later. Pre-or corequisite: 2.

2 units, Aut (Lowe)

4. Undergraduate Seminar—For prospective majors in the School of Earth Sciences and non-majors. Series of informal lectures and field trips introducing students to the earth sciences. The scope of research and teaching in the School of Earth Sciences at Stanford, career possibilities, and the importance of studying the Earth. (AU)

1 unit, Aut, Win, Spr (Stebbins)

7A,B,C. An Introduction to Wilderness Skills—Introduction to living, traveling, and working in the wilderness for those planning fieldwork in the backcountry. In-class topics: geological processes, land management, environmental ethics, first aid, animal tracking, and plant ecology. Four weekend outings focus on minimum impact backcountry skills including backcountry ski technique, back-packing, caving, food preparation, orienteering, rock climbing, snow shelter building, and telemarking. Students research the geological history of trip locations and make short presentations on their findings. 7A and 7C emphasize navigation on foot and rock climbing, and 7B emphasizes winter camping skills and backcountry skiing. Food, group, and major personal gear provided. Students provide own clothing. Fee for food and transportation. (AU)

7A. 1 unit, Aut (Bird)
7B. 1 unit, Win (Bird)
7C. 1 unit, Spr (Bird)
8. The Oceans: An Introduction to the Marine Environment—For non-majors and prospective geology, earth science, and environmental majors. Topics: topography and geology of the sea floor, evolution of ocean basins, the circulation of the ocean and atmosphere, the nature of sea water, waves, tides, and the history of the major ocean basins. The interface between continents and ocean basins, emphasizing estuaries, beaches, and continental shelves with California margin examples. The relationships between the distribution of inorganic constituents, ocean circulation, biologic productivity, and marine environments from deep sea to the coast. Lectures, demonstrations, and required one-day field trip to measure and analyze waves and currents. GER:2a (DR:5)

3 units, Spr (Ingle)

9. Field Trip to Death Valley—Priority given freshmen and sophomores and to students who have taken GES 1, 2, or 4. Introductory lectures, five-day field trip to study the geology and desert environment of Death Valley during Spring break. Observation of products of recent fault motions and volcanic eruptions in this geologically active region where a billion years of earth history are displayed in the walls of cliffs and canyons. The desert ecosystem, salt lakes, and sand dune fields are the direct result of the climatic effects of Death Valley's geologic setting. Limited enrollment.

2 units, Win (Staff)

50Q. Stanford Introductory Seminar: The Coastal Zone Environment—Preference to sophomores. The oceanographic, geological, and biological character of coastal zone environments, including continental shelves, estuaries, and coastal wetlands, with emphasis on San Francisco Bay. Five required field trips examine estuarine and coastal environments of the Bay region, and agencies and facilities concerned with monitoring. Original research on a selected aspect of the coastal zone results in a written and oral report. Enrollment limited to 10. Prerequisites: beginning course in the earth or biological sciences (e.g., 1, 2, 8, 130, Biology 1, or Earth Systems 10).

3 units, Aut (Ingle)

51Q. Stanford Introductory Seminar: Volcanoes of the Eastern Sierra Nevada—Preference to sophomores. Develop skills in researching primary sources and presenting the results of that research orally and in writing. Topics: the young volcanism, earthquake faults, and glacial features of the eastern Sierra Nevada. Four-day camping field trip over the Memorial Day weekend. (WIM)

3-4 units (Mahood) given 1998-99

52Q. Stanford Introductory Seminar: Geologic Development of California—Preference to sophomores. Crustal evolution of California in post-Paleozoic time covering the geotectonic development of most of the state. Field seminar, trips by arrange-
102. Introduction to Field Geology—Instruction and practice in the basic methods of geologic investigation in the field. Emphasis is on techniques of systematic observations and the construction of geologic maps and sections from the data obtained with a written geologic report on one of the study areas. Field area sites display a variety of rock types and landforms related to clearly defined geologic structures and events. Conducted from White Mountains Research Station in Bishop, CA for the two weeks preceding the beginning of Autumn Quarter. Contact GES, or see Summer Session Catalogue, 1998 for schedule. Prerequisites: 1, 80.

3 units, Sum (Ruetz)

105. Geologic and Environmental Problems—Supervised reading, field and/or lab work; written reports thereon.

1-10 units, any quarter (Staff)

110. Structural Geology: Introduction to Deformation in the Earth's Crust—Basic theory, principles, and techniques used to interpret and measure structures in naturally deformed rocks. Topics: the properties, rheology, and mechanisms of deformation of rocks and minerals; techniques of data collection in the field; lab and computer analysis of structural data; geometry and development of faults and folds; interpretation of geologic maps and construction of geologic cross-sections; strain measurement and structural analysis of metamorphic tectonites; the evolution of mountain belts, formation of rift-related sedimentary basins and development of strike-slip fault systems. Prerequisites: 1, calculus. Recommended: 80, 102. (WIM)

5-6 units, Spr (Miller)

111. Structural Geology and Rock Mechanics—(Same as Civil Engineering 195.) Observational techniques, analysis methods, and theoretical foundations of structural geology, engineering geology, and rock mechanics. Computer exercises are integrated with field data to understand the role of geologic structures in the evolution of the earth's crust (folding, faulting, flow, and fracturing of rock) and geologic hazards (earthquakes, landslides, and volcanoes). Topics: structural quantities and dimensional analysis; use of stress, strain, displacement, and velocity fields in structural analysis; concept and measurement of deformation; mechanical properties of rock (elasticity, viscosity, strength, friction, fracture toughness); cases studies of typical geologic structures using continuum mechanics. Computer labs. Prerequisites: 1, Calculus, Macintosh skills.

4 units, Aut (Pollard)

112. Mapping the Geological Environment—Introduction to modern techniques for mapping and measurement of geological features associated with natural resources recovery, geological hazards, and environmental problems. Use of descriptive geometry and stereographic projections to analyze geological field data. Total station survey equipment and the satellite-based Global Positioning System (GPS) are used for field data acquisition. Compilation, visualization, and presentation of 3D field data is implemented using computer graphics applications and Geographic Information Systems (GIS). Field trips. (WIM)

3-4 units, Spr (Einaudi, Pollard)

115. Engineering Geology Practice—(Same as Civil Engineering 196.) The application of geologic fundamentals to the planning and design of civil engineering projects. Emphasis is on the development of geologic skills to identify, describe, and map earth materials and geologic structures as a means of determining the impact on site development. Topics: weathering and soil-forming processes, soil and rock mechanics, site investigation techniques, surface and ground-water regimes, stream and coastal processes, quaternary tectonics, deposits and geomorphology, environmental concerns, and geologic and geotechnical hazards. Field/lab exercises and case history studies emphasize the impact of site geology on the safe planning, design, and construction of civil engineering projects such as foundation, transportation facilities, excavations, tunnels and underground storage space, water supply facilities, and marine works. Prerequisite: 111 or consent of instructor.

3 units (Holzer)

120. Geosphere—(Same as Earth Systems 110, Geophysics 110.) Geological processes, from local to global, affect people and civilization. The reverse is also true; civilization is beginning to influence the geosphere. Processes experienced at the earth's surface, (catastrophic earthquakes, volcanic eruptions, and longer term atmospheric and climate changes) are linked to what goes on in the earth's deep interior. How geochemical, geophysical, and biological processes interact over time scales ranging from 4.5 billion years to the nearly instantaneous. Topics: the origin and evolution of the atmosphere and oceans, heat flow and global tectonics and how they have changed over time, geochemical cycles, climate change, catastrophic impacts, and the roles played by organisms. Prerequisite: 1 or 2.

3 units, Aut (Siebbins, McWilliams)

130. Environmental Earth Sciences I—First of three-part sequence on the relationship of environmental earth sciences to land use planning. Project throughout sequence involves preparation of a land-use plan for a selected Bay Area location. Topics: introduction to city and regional planning, legal basis for land use planning and regulation, determinants of land use, land capability systems, geologic hazards, hydrology, use of topographic and geologic maps. Students individually or in groups prepare a reconnaissance report on a selected topic for the
131. Environmental Earth Sciences II—Topics: earthquake, landslide, and volcanic hazards and approaches to mitigation, weather and climate, environmental optimization, environmental transport, environmental impact analysis. Groups prepare and present computer generated land capability maps for the project area. Field trips to observe examples of land use projects adapted to environmental constraints.

5 units, Win (Loague, Mader)

132. Environmental Earth Sciences III—Topics: procedure for preparation of general plans, urban design, new town concepts, and site planning. Groups prepare and present a general plan diagram and text along with a proposed implementation program for the project area. Formal presentation to guest critics/city planners from project area. Field trip to examples of good design on the San Francisco Peninsula.

5 units, Spr (Mader)

133. Introduction to Assessment of Environmental Risk—Interdisciplinary approach to evaluate environmental and natural hazard risks; combines quantitative methods used in economics with earth-science information. The earth sciences, applied statistics, and microeconomics are integrated in a decision framework (cost-benefit analysis) to address site-specific issues such as locating a waste-disposal facility and regional issues such as reducing earthquake-related damage. Techniques developed are applied in a class exercise to evaluate a current land-use issue using a geographic information system (GIS). Prerequisite: 160, or equivalent, or consent of instructor.

3 units, Win (Bernknopf)


3 units (Loague) alternate years, given 1998-99

151. Sedimentary Geology and Petrography: Depositional Systems—Topics: weathering, erosion and transportation, deposition, the origins of sedimentary structures and textures, sediment composition, diagenesis, sedimentary facies, tectonics and sedimentation, and the characteristics of the major siliciclastic and carbonate depositional environments. Lab: methods of analysis of sediments in hand specimen and thin section. Field trips required. Prerequisites: 1, 2. (WIM)

4-5 units, Win (Lowe, Graham)
sizing the contrast between natural sources of hazardous elements and compounds and the types and sources of anthropogenic contaminants and pollutants. Identification of chemical and physical processes that result in weathering and soil formation. Chemical factors that affect the stability of solids and aqueous species under earth surface conditions. Emphasis is on processes that control the release, mobility, and fate of contaminants in natural waters and the roles that water and dissolved substances play in the physical behavior of rocks and soils. The scientific basis for evaluation of the impact of contaminants and design of remediation strategies. Case studies include mercury on the San Francisco Peninsula, heavy metals in the Sierra Nevada and Central Valley of California, and high-level radioactive waste disposal sites in the U.S. Prerequisite: 90 or consent of instructor.

4 units, Win (Brown)

171. Geochemical Thermodynamics—Introduction to the application of chemical principles and concepts to geologic systems. The chemical behavior of fluids, minerals, and gases using simple equilibrium approaches to modeling the geochemical consequences of diagenetic, hydrothermal, metamorphic, and igneous processes. Topics: reversible thermodynamics, solution chemistry, mineral-solution equilibria, reaction kinetics, and the distribution and transport of elements by geologic processes. Prerequisite: 80.

3 units, Aut (Bird)

181. Igneous and Metamorphic Processes—Origin of igneous and metamorphic rocks, emphasizing magmatic differentiation and subsolidus recrystallization processes and their imposed physio-chemical and tectonic conditions. The physical properties of magmas, role of volatile components, applications of trace elements and isotopes to igneous processes, geodynamics, and evolution of the crust-mantle system modeling of crystal fractionation and partial melting, relevant experimental data and phase diagrams and relations of magma types to tectonic setting. Mineral paragenesis, phase relations, metamorphic reactions, fluid/rock interactions, P-T-time paths and their imposed tectonic settings. Lab: hand-specimen and petrographic examinations of suites of igneous and metamorphic rocks. Graduate students may take without lab for 3 units. Prerequisites: 80, 90, or equivalents.

3 or 5 units, Spr (Liou)

Alternate years, not given 1998-99

185. Volcanology—For juniors, seniors, and beginning graduate students in all the earth sciences. Eruptive mechanisms, models of emplacement of pyroclastic flows and characteristics of resulting deposits, volcanic landforms and their relation to the composition and physical properties of magmas, calderas, volcanic gases, eruptive histories of volcanic centers, effects of volcanic eruptions on climate and the atmosphere, volcanic hazards and their mitigation, volcanic-hosted geothermal energy and mineral resources. One four-day field trip over Memorial Day weekend required. Prerequisite: 1 or equivalent. (WIM)

4-5 units (Mahood)

Alternate years, given 1998-99

185L. Volcanology Laboratory—Hand sample and petrographic microscope examination of volcanic rocks. Labs keyed to 185 lectures taken concurrently. Prerequisite: some experience with a petrographic microscope.

1 unit (Mahood)

Alternate years, given 1998-99

187. Introduction to Ore Deposits—The geology of hydrothermal systems, their products and processes, including: chemical, fluid inclusion, and isotopic characterization of fractures/veins and altered rocks, mineralogical, structural; distribution, geologic settings, and temporal evolution; and general models and interpretation of metasomatic processes. Focus is on understanding active hydrothermal systems in continental and oceanic settings and applications to ancient analogues, including: hot springs and mercury deposits, geothermal reservoirs and gold-silver deposits, volcanic fumaroles and magmatic-hydrothermal systems, mid-ocean-ridge hot springs and submarine massive sulfide deposits, and sedimentary basin brines and stratiform sulfide deposits. Lab: methods of study and description of veins and altered rocks; introduction to fluid inclusion microthermometry. Field trips required. Prerequisites: 80, 90.

4 units (Einaudi)

Alternate years, given 1998-99

192. Special Projects in Geological and Environmental Sciences—Supervised reading, field, and/or lab research with written reports.

1-10 units, any quarter (Staff)

195. Integrating Remote Sensing and Geographic Information Systems (GIS)—Entry-level survey of remote sensing and GIS; weekly computer-based lab session involving both subjects, stressing the interrelationships of the information from remotely sensed environmental data with the techniques and methodology of GIS. Lab enrollment limited to 20.

3 units, Aut (Lyon)

196. Introduction to GIS: ARC and ERMA—(Same as Geophysics 196.) Hands-on experience with ESRI’s ARC/INFO or Intergraph’s ERMA commercial GIS packages. Topics: setting up geographic databases and manipulating spatial data, including database query and analysis. Class project using a sample ARC or ERMA dataset on workstations. Guest lectures on GIS applications in environmental, geological and biological sciences, and town planning. Prerequisite: Geophysics 111 or equivalent knowledge, and consent of instructor.

2 units, Win (Klemperer)
197. Research in the Application of Geographic Information Systems (GIS)  
1-3 units, Aut, Win, Spr (Klemperer)  

198. Special Problems in Geological and Environmental Sciences—Supervised reading, field, and/or lab research with written reports. Undergraduates must take a minimum of 3 units for a letter grade to meet the WIM requirement. (WIM)  
1-10 units, any quarter (Staff)  

199. Honors Program—Research on a topic of special interest. See “Undergraduate Honors Program” above.  
3 units, Aut, Win, Spr, Sum (Staff)  

GRADUATE  

200. Fluids in the Earth's Crust—(Enroll in Geophysics 200.)  
3 units, Spr (Nur)  

3 units, Win (Zoback)  

205. Advanced Oceanography—For upper-division undergraduates and graduate students in the earth, biologic, and environmental sciences. Topical issues in marine science/oceanography. Subjects covered vary each year following or anticipating research trends in oceanographic research. The focus is on links between circulation and physics of the ocean with climate in the North Pacific region and marine ecologic responses. Lectures/discussion, with participation by marine scientists from various marine research groups and organizations including the Monterey Bay Aquarium Research Institute.  
3 units, Spr (Dunbar)  

210. Geologic Evolution of the Western U.S. Cordillera—For undergraduates and graduates. Overview of the geology of the western states. The evolution of the mountain belt from its inception in the Precambrian to its contemporary history of extension and strike-slip faulting, based on the description, analysis, and interpretation of the rock record through time. Characteristic structural styles developed during crustal shortening, extension, and strike-slip tectonic regimes; tectonic controls on sedimentary basin formation; plate margin magmatism and metamorphism; and the relation of plate motions to the land geologic record provide insight into the crustal-scale processes and driving mechanisms common to mountain chains.  
2-3 units, Win (Miller)  
alternate years, not given 1998-99  

211. Topics in Regional Geology and Tectonics—Seminar.  
2 units, Win (Miller)  

215. Advanced Structural Geology and Rock Mechanics—(Same as Geophysics 215.) Observational techniques, analysis methods, and theoretical foundations of structural geology, engineering geology, and rock mechanics. Computer exercises are integrated with field data to understand the role of geologic structures in the evolution of the earth's crust (folding, faulting, flow, and fracturing of rock) and geologic hazards (earthquakes, landslides, and volcanoes). Topics: structural quantities and dimensionai analysis; use of stress, strain, displacement, and velocity fields in structural analysis; concept and measurement of deformation; mechanical properties of rock (elasticity, viscosity, strength, friction, fracture toughness); cases studies of typical geologic structures using continuum mechanics. Computer labs. Prerequisites: 1, calculus, Macintosh skills.  
4 units, Aut (Pollard)  

216. Rock Fracture Mechanics—(Same as Geophysics 216.) Theoretical and experimental principles of continuum and fracture mechanics applied to the origin and physical behavior of faults, dikes, joints, veins, solution surfaces, and other natural structures in rock. Field observations, engineering rock fracture mechanics, and the elastic theory of cracks. Role of natural fractures in brittle rock deformation, fluid flow, and heat transport in the earth's crust with applications to crustal deformation and tectonophysics, structural geology, petroleum geology and engineering, and hydrogeology. Prerequisites: 215 or equivalent.  
3-4 units, Spr (Pollard)  
alternate years, not given 1998-99  

217. Characterization and Hydraulics of Rock Fractures—Interdisciplinary survey of natural fractures (faults, joints, veins, and solution seams) and their geological, geophysical, geomechanical, stochastic, and hydraulic properties. Case studies of fracture characterization experiments and problems related to fluid flow in aquifers, oil and gas reservoirs, and waste repository sites in fractured rock. Invited lecturers from various disciplines and one weekend field trip. Prerequisite: equivalent of first-year graduate student in Geological and Environmental Sciences, Geophysics, or Petroleum Engineering. 
3 units (Aydin) alternate years, given 1998-99  

220. Ecosystem Sciences and Biogeochemistry—For upper-division undergraduates and graduate students in the earth and biological sciences. Processes by which components of terrestrial ecosystems interact, drawing on areas of geology, soil science, hydrology, chemistry, biology, and ecology.  
3 units (Matson)  
alternate years, given 1998-99
223. Seminar in Environmental Problem Solving—For upper-division undergraduates and graduate students in the earth and biological sciences. Using case studies, evaluates and contrasts the approaches that different natural and social science disciplines bring to environmental problem solving.

2-3 units, Spr (Matson)
alternate years, not given 1998-99

230. Physical Hydrogeology—(Same as Civil Engineering 260A.) Theory of underground water, analysis of field data and pumping tests, geologic groundwater environments, solution of field problems, groundwater modeling. Introduction to groundwater contaminant transport and unsaturated flow. Prerequisite: elementary calculus. (WIM)

5-6 units, Aut (Konikow)


4 units, Spr (Gorelick)

233. Aquifer Management Modeling—Introduction to the combined use of aquifer simulation models and optimization techniques. Reviews recent literature. Topics: introduction to selected methods in operations research, water quantity and quality simulation-optimization modeling methods, policy evaluation and allocation models, and conjunctive water use management models. Prerequisites: 230, 231 or equivalent, introductory computer programming.

3 units (Gorelick) not given 1997-98

235. Role of Fluids in Geologic Processes—Principles governing flow of groundwater and its interaction with crustal stress, heat flow, and chemical mass transport. Topography-driven flow of groundwater on regional scale; compaction-driven flow in sedimentary basin; development of anomalous fluid pressure; role of fluid in tectonism; migration and entrapment of petroleum; density driven flow and thermal anomaly; formation of mineral deposits. Prerequisite: 230.

3 units (Hsieh) alternate years, given 1998-99

236. Hydraulic and Tracer Tests for Groundwater Resource Evaluation—Theory and application of hydraulic and tracer tests to determine flow and transport properties of aquifers. Analysis of well test in single-layer aquifers and multiple aquifer-aquitard systems; water table conditions; anisotropy; double-porosity; effects due to wellbore stor-

age, wellbore skin, aquifer boundaries, and heterogeneity such as faults and fracture zones; natural and forced gradient tracer tests. Prerequisite: 230.

3 units, Spr (Hsieh)
alternate years, not given 1998-99


4 units, Aut (Loague)
alternate years, not given 1998-99

238. Soil Physics—Advanced level, focusing on the physical and chemical properties of the soil solid phase with emphasis on the transport, retention, and transformation of water, heat, gases, and solutes in the unsaturated subsurface. Agricultural systems. Field techniques and classic experiments demonstrated and reproduced in the lab. Prerequisite: elementary calculus. Recommended: 230.

4 unit, Aut (Loague)
alternate years, given 1998-99


3 units, Win (Loague)
alternate years, not given 1998-99

240. Geostatistics for Spatial Phenomena—(Same as Petroleum Engineering 240.) Probabilistic modeling of spatial and/or time dependent phenomena. Kriging and cokriging for gridding and spatial interpolation. Integration of heterogeneous sources of information. Stochastic imaging of reservoir/field heterogeneities. Case studies from the oil industry and environmental sciences. Prerequisites: introductory calculus and linear algebra, Statistics 116 or equivalent.

3-4 units, Win (Journel)

241. Practice of Geostatistics on Exhaustive Data Bases—(Same as Petroleum Engineering 241.) Data set used relates to a large N. sed reservoir and includes typical spots of hard data and more extensive soft information (seismic/geological interpretation). Student teams independently perform reservoir characterization, share results in class. Reservoir study through maps, variograms, kriging, and stochastic models. Extensive use of GSLIB and 3D visualization software. Flow simulations for recov-
ery forecast and placement of additional wells. Prerequisites: 240, FORTRAN/UNIX; Recommended: 246.

3-4 units, Spr (Journal)

242A. Topics in Advanced Geostatistics—(Same as Petroleum Engineering 242A.) Conditional expectation theory and projections in Hilbert spaces; parametric vs. non-parametric geostatistics; Boolean, Gaussian, fractal, indicator, annealing approaches to stochastic imaging; Bayesian methods for data integration; techniques for upscaling hydrodynamic properties. May be repeated for credit. Prerequisites: 240, advanced calculus, Fortran/Unix.

3 units (Journal) not given 1997-98

245. Computer Simulation in Geology—(Students may participate in 345.) Procedures for developing dynamic geologic process simulation models in geology, stressing numerical solutions of differential equations to represent the processes. Initial applications include simple two- and three-dimensional flow models. Stochastic procedures introduced. Emphasis on graphic display, with use of three-dimensional graphics computers. Prerequisite: elementary computer programming.

3 units (Harbaugh) alternate years, given 1998-99

246. Reservoir Characterization and Flow Modeling with Outcrop Data—(Same as Petroleum Engineering 246.) Class project designed to provide earth science students an understanding of how to use outcrop observations in quantitative geological modeling and flow simulation. Addresses a specific reservoir management problem by studying suitable outcrop analogue (weekend field trip), constructing geostatistical reservoir models, and performing flow simulation. Provides Geology, Geophysics, and Petroleum Engineering students an introduction, through an applied example, to the relationship between the disciplines. A different reservoir management question and outcrop analogue is studied each year. May be repeated for credit.

3 units (Deutsch, Graham) given 1998-99

247. Oil Field Exploration and Development—(Same as Petroleum Engineering 247.) Analyzes an actual oil or gas exploration or exploitation venture that includes drilling one or more wells. Students prepare comprehensive analyses and recommendations that include interpretations of the geology, engineering specifications for wells, lease acquisition, and preparation of financial forecasts. An actual well may be drilled later based on the recommendation.

3 units, Spr (Harbaugh, Kourt) alternate years, not given 1998-99

248. Risk Analysis in Petroleum Exploration—(Same as Petroleum Engineering 248.) Use of formal procedures to make optimum financial decisions in petroleum exploration and exploitation. Estimation of probabilities attached to exploration actions and their utilization in financial forecasts. Extensive use of PC-based problem sets that include a computerized exploration exercise with competing teams. Concepts are applicable to resource exploration and development in general.

3 units (Harbaugh) alternate years, given 1998-99

249. Application of Biological Markers to Understanding Petroleum Systems—Biological markers (molecular fossils) are introduced and described from fundamentals to their application to understanding and mapping petroleum systems. Biomarkers in rocks and petroleum provide information on paleoenvironment, geologic age and stratigraphy, thermal maturity, migration, diagenesis, and biodegradation. Biomarker "fingerprints" are useful to monitor and determine the environmental fate of petroleum. Current research topics and a detailed introduction to the petroleum systems used for basin analysis by modern exploration geologists. Global applications of regional studies.

2-4 units, Win (Moldowan)

250. Sedimentation Mechanics—The mechanics of sediment transport and deposition and the origins of sedimentary structures and textures as applied to interpreting ancient rock sequences. Dimensional analysis, fluid flow, drag, boundary layers, open channel flow, particle settling, erosion, sediment transport, sediment gravity flows, soft sediment deformation, and fluid escape. Field trip required.

3 units, Aut (Lowe) alternate years, not given 1998-99

251. Sedimentary Basins—Analysis of the depositional framework and tectonic evolution of sedimentary basins. Topics: tectonic and environmental controls on facies relations, synthesis of basin development through time in terms of depositional systems and tectonic settings. Weekend field trip required. Prerequisites: 110, 151.

3 units, Aut (Graham)

252. Sedimentary Petrography—Examination/interpretation of siliciclastic sediments and sedimentary rocks. Lectures/reading stress research in modern sedimentary mineralogy and petrography and the relationship between the composition and texture of sediments and their provenance, tectonic settings, and diagenetic histories. Class is topical and varies yearly. Prerequisite: 151 or equivalent.

4 units (Lowe) alternate years, given 1998-99

253. Petroleum Geology and Exploration—The basics of petroleum geology. Origin, occurrence, and exploration for hydrocarbons. Topics: thermal maturation history in hydrocarbon generation, significance of sedimentary and tectonic setting, principles of accumulation, geological and geophysical exploration techniques, and unconventional hydro-
carbon resources. Prerequisites: 110, 151. Recommended: Geophysics 183.

3 units (Graham)

254. Paleoceanography—Paleochemistry and paleocirculation of the oceans as deduced from the study of marine sediments.

3 units (Dunbar)
alternate years, given 1998-99

255. Introduction to Micropaleontology—Microscopic marine fossils including diatoms, ostracods, and radiolarians with emphasis on foraminifera. Principles of classification, evolutionary trends, common genera, ecology, and environmental distribution of foraminifera. Application of planktonic and benthic foraminifera to interpretation of paleoenvironments, paleoecologicographic and paleoclimatic analysis, and correlation of marine sequences. Paleoenvironmental and age analysis of an unknown microfossil sample serves as a term research project.

5 units, Aut (Ingle)
alternate years, not given 1998-99

256. Advanced Micropaleontology—The use of marine microfossils (mainly benthic and planktonic foraminifera) to solve fundamental geologic and oceanographic problems. Applications to geochronology, correlation, paleoecology, and paleoceanography. Individual analysis of a series of unknown samples provides intensive experience in applying basic concepts of biostratigraphy and paleoenvironmental analysis to interpretation of Paleozoic, Mesozoic, and Cenozoic microfossil assemblages. Lectures on classic and current examples of research in this field. Prerequisite: 255.

3 units, Win (Ingle)
alternate years, not given 1998-99

257. Climate Variability and Forcing Mechanisms of the last 2000 Years: Implications for Life in the 21st Century—Open to graduate students and seniors in programs in the earth sciences, earth systems, ecology, and anthropology. Overview of large-scale features of the climate system that control interannual variability in temperature and rainfall. Recent studies in climate reconstruction and the influence of climate change on man. Format is a mixture of lectures and readings and discussions.

3 units, Spr (Dunbar)
alternate years, not given 1998-99

259. Seminar: Sedimentary Geology—Discussion of current topics in sedimentary geology.

2 units, Win (Graham)

261. Physics and Chemistry of Minerals and Mineral Surfaces—Discussion of the concepts of symmetry and periodicity in crystals; physical properties of crystals and their relationship to atomic-level structure; basic structure types; crystal chemistry and bonding in solids and their relative stability; interaction of x-rays with solids and liquids (scattering and spectroscopy); structural variations in silicate glasses and liquids; UV-visible spectroscopy and the color of minerals; review of the mineralogy, crystal chemistry and structures of selected rock-forming silicates and oxides; mineral surface and interface geochemistry.

4 units, Spr (Brown)
alternate years, not given 1998-99

262. Thermodynamics and Disorder in Minerals and Melts—Thermodynamic properties of crystalline, glassy, and molten silicates and oxides in light of microscopic information about short range structure and ordering. Measurements of bulk properties, e.g., enthalpy, density, and their pressure and temperature derivatives, and structural determination by spectroscopies such as Nuclear Magnetic Resonance and Mössbauer. Basic formulations for configurational entropy, heats of mixing in solid solutions, activities, and the energetics of exsolution, phase transitions, and nucleation. Quantitative models of silicate melt thermodynamics are related to atomic-scale views of structure. A general view of geothermometry and geobarometry. Prerequisites: introductory mineralogy and thermodynamics.

4 units (Stebbins)
alternate years, given 1998-99

264. Low Temperature Aqueous Geochemistry—(Same as Civil Engineering 273.) Systematic study of principles needed for solving quantitative problems in aqueous geochemistry. The use of thermodynamics in predicting extent of chemical processes, e.g., dissolution and precipitation, hydrolysis and complexation, oxidation and reduction. Emphasis on resolution of general questions into tractable problems and on problem solving and graphic representation of results. Prerequisite: 171 or equivalent experience with thermodynamics.

3 units, Aut (Redden)


3 units (Bird) alternate years, given 1998-99

268. Geochemistry of Mineral Deposits—Lectures integrating observational, theoretical, and experimental data on the origin of mineral deposits
and application to exploration concepts. Individual projects. Prerequisites: 120, 170.
4 units (Einaudi)
alternate years, given 1998-99

270. Petrologic Phase Equilibria—Principles of phase equilibrium determined by lab experimentation and thermochemical calculation, as applied to igneous and metamorphic petrology. Focuses on the underlying principles of classical thermodynamics which govern mineral equilibria. Introduction to phase relations, element partitioning, chemical kinetics, and order-disorder phenomena in geologic systems.
4 units, Spr (Ernst)

275. Electron Microanalytical Techniques—Practical and theoretical aspects of x-ray generation and detection and the behavior of electron beams and x-rays in solids. Basic principles needed to quantitatively analyze chemically complex geological materials. Operation of the JEOL 733 electron microprobe and associated computer software for quantitatively analyzing materials. X-ray chemical mapping. Enrollment limited to eight.
333 units, Win (Jones)

285. Isotopes and Trace Elements in Petrogenesis and Crustal Evolution—Radiogenic isotopes (Rb-Sr, Sm-Nd, Re-Os, U-Pb, and U-series disequilibrium systems) and stable isotopes applied to geologic processes; formation of meteorites and early history of the earth; continental growth curves; evidence for nature of basalt sources and implications for mantle convection; interaction of magmas with mantle and crust; residence times of magmas and magma chamber processes; granites as imperfect mirrors of their source regions; trace-element modeling of igneous processes; trace-element discriminant diagrams in tectonic analysis; sedimentary recycling; paleoenvironmental uses of oxygen isotopes; sources of ore forming metals. Emphasizes interests of students. Prerequisites: 151, 165, 181 or their equivalents.
3 units (Mahood)
alternate years, given 1998-99

289. Ion Microprobe Mass Spectrometry—Basics of mass spectrometry, sputtering and ionization theory, instruments, microanalytical techniques; applications in geochemistry, cosmochemistry and geochronology including trace elements, stable isotopes, and radiogenic systems. Practical application on the SHRIMP RG.
3 units (Ireland)
alternate years, given 1998-99

290. Numerical Analysis of Geological Time Series—Seminar for graduate students interested in a variety of statistical tools appropriate for analysis of time series. Topics: fourier transform techniques, singular spectrum analysis, evolutionary spectral analysis, and filtering. Some knowledge of UNIX required.
3 units (Dunbar)
alternate years, given 1998-99

292. Field Mapping of Mineral Deposits—Seven-day field trip to a mineral district in California or Nevada, emphasizing detailed mapping of outcrops, adits, and (where possible) underground workings. Students prepare maps and produce a report suitable for presentation to management or for publication. Register Spring Quarter. Prerequisite: 187.
3 units, Spr (Einaudi)

295. Integrating Remote Sensing and Geographic Information Systems (GIS)—For graduate students; see 195.

296. Introduction to GIS: ARC and ERMA—(Same as Geophysics 296.) For graduate students; see 196.

297. Research in the Application of Geographic Information Systems (GIS)—For graduate students; see 197.

310. Advanced Field Mapping—10-14 days mapping in a structurally complex region. Emphasis is on collecting detailed structural, stratigraphic, and sedimentologic data to solve a topical problem in either regional and/or local geology. Prerequisite: consent of instructor.
3 units, any quarter (Miller)

314A,B,C. Research Seminar: Quantitative Structural Geology, Active Tectonics, and Geomechanics—Selected topics. May be repeated for credit.
1 unit, Aut, Win, Spr (Pollard, Aydin)

1-2 units, Aut, Win, Spr (Loague)

330A,B,C. Advanced Topics in Hydrogeology—Critical discussion of modern topics in groundwater hydrology. Topics: questioning classic explanations of physical processes; consideration of coupled physical, chemical, and biological processes effecting heat and solute transport.
1-2 units, Aut, Win, Spr (Gorelick)

332A,B. Seminar in Hydrogeology
332A. 1-2 units, Aut (Loague)
332B. 1-2 units, Win (Loague)

333. CESIR Seminar—The Center for Earth Science Information Research seminars are a multidisciplinary lecture series. Emphasis is on the utilization of science for policy analysis and decision
making. Speakers are from the physical and social sciences.

1-2 units, Spr (Bernknopf)

342A,B,C. Seminar: Geostatistics—Discussion of classic results and current research in geostatistics. Topics selected on basis of interest and timeliness. May be repeated for credit.

1-2 units, Win, Spr (Journal)

350. Seminar in Sedimentary Geology

1-3 units, Win, Spr (Staff)

360. Topics in Low Temperature Surface and Aqueous Geochemistry—Guided independent study, analysis, and critical oral and written reports on selected topics in environmental, surface, and/or aqueous geochemistry under earth-surface conditions. Prerequisites: 80 and 264; consent of instructor.

2-4 units, one quarter annually (Brown, Parks)

373. Seminar in Metamorphic Petrology—Selected topics in metamorphic and tectonic processes, research problems and methods of study of metamorphic rocks and their tectonometamorphic evolutions. Prerequisite: consent of instructor.

1-2 units, Spr (Liou, Ernst)

375A,B. Seminar and Field Trip: Ore Genesis—Research aimed at understanding the features and processes related to a particular class of mineral deposits. Topics are selected on basis of participant interest and timeliness. Field trip (1-2 wks.) and guidebook preparation. Papers and oral presentations. Pre- or corequisite: 268.

2 units (Einaudi) given 1998-99

385. Practical Experience in the Geosciences—On-the-job training in the geosciences. May include summer internship; emphasizes training in applied aspects of the geosciences, and technical, organizational, and communication dimensions. Meets INS requirements for F-1 Curricular practical training.

1 unit, any quarter (Staff)

Problems in Various Fields of Geological and Environmental Sciences

313. Problems in Quantitative Structural Geology, Neotectonics, and Geomechanics

319. Problems in Structural Geology

339. Problems in Hydrogeology

349. Problems in Geomathematics

357. Problems in Sedimentary Geology

358. Problems in Oceanography and Paleoclimatology

363. Problems in Organic Geochemistry

369. Problems in Geochemistry

377. Problems in Ore Deposits and Exploration

379. Problems in Metamorphic Petrology

386. Problems in Volcanology and Igneous Petrology

389. Problems in Geochronology and Isotope Geology

Research in Various Fields of Geological and Environmental Sciences

413. Research in Quantitative Structural Geology, Active Tectonics, and Geomechanics

419. Research in Structural Geology

438. Research Methods in Hydrology

439. Research in Hydrogeology

440. Research in Geostatistics for Natural Resources Management

449. Research in Geomathematics

452. Research in Basin Analysis Petroleum Geology

457. Research in Sedimentary Geology

458. Research in Oceanography and Paleoclimatology

460. Research in Low Temperature Surface and Aqueous Geochemistry

463. Research in Organic Geochemistry

469. Research in Geochemistry

477. Research in Ore Deposits and Exploration

479. Research in Metamorphic Petrology

486. Research in Volcanology and Igneous Petrology

489. Research in Geochronology and Isotope Geology

GEOPHYSICS

Emeritus: George A. Thompson, Jr. (on active duty)

Chair: Amos M. Nur

Professors: Jon F. Claerbout, Steven Gorelick†, Robert L. Kovach, Amos M. Nur, Jonathan Roughgarden*, Norman H. Sleep, Mark D. Zoback

Associate Professors: Gregory C. Beroza, Jerry M. Harris, Simon L. Klemperer, Michael O. McWilliams†, Paul Segall, Howard Zebker**

Professor (Research): Antony Fraser-Smith**

Associate Professor (Research): Gerald M. Mavko

Research Associates: Ginger A. Barth, Colleen A. Barton, Jack Dvorkin, Daniel Moos, Mark H. Murray, Manika Prasad

Courtesy Professors: Stephan A. Graham, David D. Pollard

Lecturers: Phillip Farrell, Tapan Mukerji

Acting Associate Professor: Biondo Biondi

Consulting Professors: James Berryman, William Ellsworth, Rosemary Knight, Walter Mooney, Francis Muir, David Scholl, Paul Spudich, Brian Tucker

Consulting Associate Professor: Zhijing Wang

Consulting Assistant Professor: David Lumley
Visiting Professor: Don L. Anderson
Visiting Associate Professor: Takatoshi Ito
* Joint appointment with Biological Sciences
† Joint appointment with Geological and Environmental Sciences
** Joint appointment with Electrical Engineering

Geophysics is the branch of earth science concerned with exploring and analyzing active processes of the earth through physical measurement. The undergraduate and graduate programs are designed to provide (1) a background of fundamentals in science, and (2) courses in geophysics to coordinate these fundamentals with principles of geophysics. The program leading to the Bachelor of Science (B.S.) in Geophysics permits many electives and a high degree of flexibility for each individual student. Graduate programs give specialized training for professional work in exploration, research, and education.

The Department of Geophysics is housed in the Ruth Wattis Mitchell Earth Sciences Building. It has a number of research facilities among which are a state-of-the-art broadband seismic recording station, a rock-magnetism laboratory, a geochronology laboratory, numerous computers, a high pressure and temperature rock deformation laboratory, various instruments for field measurements including 200 seismic group recorders, nine dual frequency GPS receivers, and field equipment for measuring in situ stress at great depth. Current research activities include earthquake mechanics, rock physics, earthquake reflection, refraction and tomographic seismology, seismic studies of the continental lithosphere, isotopic age dating, paleomagnetic investigations, behavior of the geomagnetic field, and studies of crustal deformation (strain) and crustal force (stress). Graduate programs lead to the degrees of Master of Science and Doctor of Philosophy.

UNDERGRADUATE PROGRAMS
BACHELOR OF SCIENCE

Objectives—To provide a solid background in the essentials of math, physics, and geology, while at the same time providing knowledge about the entire spectrum of geophysics ranging from exploration geophysics to earthquake seismology and plate tectonics. Students are prepared for either an immediate professional career in the resources and environmental sciences industries or future graduate study.

The following course requirements for the B.S. degree in Geophysics are in addition to the University requirements in general studies. A written report on original research or an honor's thesis is also required. Normally, this is undertaken as part of the student's participation in three quarters of Research Seminar (Geophysics 185A, D,E,F,G,H,J,K,L,M,S,T,V) during the senior year. Seniors in Geophysics who expect to do graduate work are urged to take the Graduate Record Examination as early as is convenient in their final undergraduate year.

CURRICULUM

Course No. and Subject
Chem. 31. Chemical Principles
Chem. 135. Physical Chemical Principles or Physics 170, 171. Thermodynamics
Elect. Engr. 141. Electromagnetic Fundamentals or Physics 120. Electricity and Magnetism
Geol. & Envir. Sci. 1. Planet Earth
Geol. & Envir. Sci. 80. Earth Materials
Geol. & Envir. Sci. 102. Introduction to Field Geology
Geol. & Envir. Sci. 110*, 111. Structural Geology
Math. 19, 20, 21, and 44, or 41, 42, 43, and 44.
Math. 130. Ordinary Differential Equations
Physics 51, 53, 54, 55, and 56. Elementary Physics
Physics 110, 111. Mechanics

* Indicates that the course meets the Writing in the Major (WIM) requirements.

The curriculum includes 9 units of Geophysics electives.
Particularly recommended to fill the 9-unit requirement are 150, 174, 190. Other suggested Geophysics electives are 102, 182, 183, 195, 262, 276, 284, 285.

Recommended elective courses that do not fill the 9-unit requirement are Comp. Sci. 105 or 106; Geol. and Envir. Sci. 190A and B, and 181; Physics 57, 58, 64A, 64B, 120, 121, 122, 210, 211, or Elect. Engr. 142; Math. 103, 106, 113, 114, 131, 132; and Chem. Engr. 140, 150.

MINORS

The objective of the Geophysics minor is to provide students with a general knowledge of geophysics in addition to background in the related fields of physics, mathematics, and geology.

Curriculum—
1. Geophysics 110. Geosphere
2. General Geophysics or Geophysics 170. Environmental Geophysics
4. Math. 44. Vector Calculus
5. Math. 130. Ordinary Differential Equations
6. Physics 41. Mechanics
7. One approved 100-level (or higher) course on either electricity and magnetism, wave propagation, continuum (solid or fluid) mechanics, or the physics of materials.
HONORS PROGRAM

The department offers a program leading to the B.S. degree in Geophysics with Honors. The guidelines are:

1. Select a research project, either theoretical, field, or experimental, that has the approval of an adviser.
2. Submit a proposal to the department, which will decide on its suitability as an honors project. Necessary forms are in the department office.
3. Course credit for the project is assigned by the adviser within the framework of Geophysics 205.
4. The decision as to whether a given independent study project does or does not merit an award of honors shall be made jointly by the department and the student's adviser. This decision shall be based on the quality of both the honors work and the student's other work in earth sciences.
5. The work done on the honors program should not be used as a substitute for regularly required courses.

GRADUATE PROGRAMS

MASTER OF SCIENCE

Objectives—To provide the theoretical and practical background needed for a career in petroleum exploration or development geophysics. The program takes four quarters, beginning and ending in the Autumn Quarter. A summer internship working in industry or in a government lab is an integral part of the program. A written report based on the summer internship is completed in the final Autumn Quarter.

Prerequisites—B.S. degree in engineering, geology, geophysics, mathematics, or physics; a sequence of courses in mathematics at least through ordinary differential equations; and at least one course in introductory geology. The following additional undergraduate courses are recommended: computer science, complex variables, linear algebra, petrography, and structural geology.

Requirements for the Degree—Geophysics 170 or 190, 174, 182, 183, 184, 262, 284, 380A, 380B, 397; Geological and Environmental Sciences 110 or 111 and 112, 240, 247 or 248, 251, 253; Petroleum Engineering 120, 130, 131; and Electrical Engineering 104 or 261 or 363; and elective courses in earth sciences, mathematics, physics, and engineering. Recommended electives include Geophysics 111, 150, 285, 397; and Geological and Environmental Sciences 151, 254. If appropriate, based on previous experience, requirements may be waived and additional electives substituted with consent of the program adviser. At least 45 units are normally required for the completion of this degree.

DOCTOR OF PHILOSOPHY

Objectives—The Ph.D. degree is conferred upon evidence of high attainment in Geophysics and ability to conduct an independent investigation and present the results of such research.

Requirements for the Degree—A minimum of three years and the completion of 108 units of graduate study at Stanford must be satisfactorily completed. At least two of these years, ordinarily the first, must be spent as a registered student at Stanford. During the first year, candidates take three quarters of Research Seminar (Geophysics 385A,D,E,F,G,H,J,K,L,M,S,T,V,Y). Ph.D. candidates in Geophysics are required to complete Physics 121 or Electrical Engineering 142; Electrical Engineering 261; Engineering 102W; Physics 210 and 211, or Math. 220A and 220B, or Mechanical Engineering 201A and 201 (B or C); and five courses from the following groups, no more than one course per group: 102; 142, 242; 174; 183; 195; 200; 210; 211; 251; 262; 276; 280; 283; 287; 298, 290. Additional advanced courses are selected from the following topics: applied physics, astrophysics, atomic and nuclear physi-
ics, communications theory, computer sciences, civil engineering, chemical engineering, electromagnetic theory, engineering mechanics, geology, geophysics, geostatistics, materials science, physics of solids, and thermodynamics.

Students who wish to waive any of the required courses must petition the department in writing before their admission to candidacy. Petitions must state a well-reasoned plan for the substitute requirements. Petitions submitted after admission to candidacy are approved only in extraordinary circumstances. Students without practical electronics experience are strongly encouraged to take a lab course such as Engineering 40.

The candidate's record must indicate outstanding scholarship, and deficiencies in previous training must be improved. Course work or demonstrable knowledge of earth science at the level of Geophysics 110 is required. Experience as a teaching assistant (quarter-time for at least two academic quarters) is required for the Ph.D. degree. The student must pass the departmental written qualifying examination (given annually in late September) by the second year; pass the departmental oral examination by presenting and defending a written research paper or proposal by the end of the second year; submit an Application for Candidacy; fulfill the requirements of the minor department, if a minor is elected; prepare under faculty supervision a dissertation that is a contribution to knowledge and the result of independent work expressed in satisfactory form; and pass the University oral examination, which is essential a defense of the dissertation.

The Ph.D. dissertation must be submitted in its final form within five calendar years from the date of admission to candidacy. Candidates who fail to meet this deadline are required to reapply for admission to candidacy and retake the department and University oral examinations. They are given one additional year in which to submit dissertations.

University requirements for the M.S. and Ph.D. are described in the "Graduate Degrees" section of this bulletin.

COURSES

4. Natural Hazards and Human Survival—For non-majors and potential earth scientists. Introduction to understanding natural and other hazards, earthquakes, volcanic eruptions, tsunamis, toxic waste disposal, nuclear power plant siting, their risk assessment, possible mitigation, and protective measures. GER: 2a (DR: 5)

3 units, Aut (Beroza, Segall)
Win (Kovach)

5Q. Stanford Introductory Dialogue: Earthquakes of the Americas—Preference to sophomores. Earthquakes have had an impact on the development of cultures and societies. Early natives regarded earthquakes as mystical signs. After the arrival of the Spanish, 1500s to the 1700s, earthquakes were viewed as God's retribution. As our perception of the causes and effects of earthquakes have changed, there are increased expectations for technological solutions. The societal consequences and ramifications of some key earthquakes in the Americas.

1 unit, Aut (Kovach)

20Q. Stanford Introductory Seminar: Quantification of Earthquakes—Preference to sophomores. Using seismic waves to understand earthquakes. Fundamentals of wave propagation in the Earth, why and where earthquakes occur, how they generate seismic waves. Interpretation of seismograms for real earthquakes that occur around the world during the quarter. Lecture/lab.

4 units, Win (Beroza)


3 units, Spr (Zebker)

60Q. Stanford Introductory Seminar: Viewing Hazards on Earth from Space—(Same as Electrical Engineering 60Q.) Preference to sophomores. Natural hazards (earthquakes, volcanoes, floods, hurricanes, and fires) affect thousands of people everyday. Twenty years of developments in spaceborne imaging technology monitor and respond to such disasters more rapidly than in the past, saving lives and money. Understanding the physical processes involved allows us to anticipate and plan for mitigation of the consequences. How these new tools are applied to natural disasters, and how the remotely-sensed data are manipulated and analyzed.

2-3 units, Win (Zebker)

100. Stanford Introductory Dialogue: Earthquake Archaeology—Finding more Dead Sea Scrolls—Preference to sophomores. Destruction by earthquakes left a much greater mark on archaeological discoveries than assumed by archaeologists, especially during antiquity. Obvious examples are Troy, Sparta, Jericho, Megiddo (Armageddon), or Rome. More complicated are the Dead Sea scrolls, buried not by the Essenes who wrote them, but by an earthquake in 31 B.C. that brought down the roofs of caves in which they were stored. More scrolls may remain to be discovered in a project involving Stanford and Ben Gurion University in Israel. Seminar helps plan this project: the effects of historical earthquakes; how to locate more scrolls; select caves for excavation; and how to excavate inside collapsed caves, combining archaeology, history, earth sciences, and engineering.

2 units, Spr (Nur)
102. Geomagnetism and Paleomagnetism—The application of paleomagnetic methods to problems in tectonics and stratigraphy. Origin and analysis of the geomagnetic field, origin of magnetization in geological materials, techniques of measurement, data analysis, apparent polar wandering and plate motion, and analysis of terrane displacement. Students conduct a small-scale paleomagnetic study as a research project. Prerequisite: Geological and Environmental Sciences 1 or 2. Recommended: 150, Geological and Environmental Sciences 110, Physics 53.

3 units (McWilliams)
alternate years, not given 1998-99

106. Planetary Exploration—(Enroll in Electrical Engineering 106.)
3 units, Spr (Fraser-Smith)

110. Geosphere—(Same as Earth Systems 110, Geological and Environmental Sciences 120.) Geophysical processes, from local to global, affect people and civilization. The reverse is also true; civilization is beginning to influence the geosphere. Processes experienced at the earth's surface (catastrophic earthquakes, volcanic eruptions, and longer-term atmospheric and climate changes) are linked to what goes on in the earth's deep interior. How geochemical, geophysical, and biological processes interact over time scales ranging from 4.5 billion years to the nearly instantaneous. Topics: the origin and evolution of the atmosphere and oceans, heat flow and global tectonics and how they have changed over time, geochemical cycles, climate change, catastrophic impacts, and the roles played by organisms. Prerequisite: Geological and Environmental Sciences 1 or 2.

3 units, Aut (Stebbins, McWilliams)

111. Introduction to Computing in Earth Sciences—Computing tools for research in earth sciences. How to use existing hardware and software tools. Focuses on: UNIX operating system, computer networking, graphics software, text processing software, and management of programming projects.
1 unit, Aut (Farrell, Mukerji)

112. Exploring Geosciences with MATLAB—Introduction to efficient use of Matlab as a tool for research in Earth Sciences. Hands-on, computer-based exercises explore the 2-D and 3-D visualization features, numerical capabilities, and various Matlab toolboxes, addressing simple problems in widely applicable areas, e.g., regressions, least-squares, Fourier transforms and filtering in 1- and 2-D, simple spectral analysis, differential equations, and simulations. Emphasis from a scientific and engineering application perspective.
1 unit, Aut (Mukerji)

4 units, Aut (Roughgarden)

150. Plate Tectonics—Description and evolution of movements between lithospheric plates as determined from geologic and geophysical data. Topics: relative velocities between plates; marine magnetic anomalies; interpretation of paleomagnetic data; seismicity at plate boundaries; geologic processes at rises, trenches, and transforms; causes of plate motions; the relationship of plate tectonic processes to the geology of California. Prerequisites: knowledge of plate geometry, vectors, Geological and Environmental Sciences 1 or 2, or consent of instructor.

2-3 units (Sleep)

155. Interdisciplinary Aspects of Reservoir Management—(Same as Petroleum Engineering 150.) Survey of reservoir characterization steps needed for optimal reservoir management: problem areas and avenues of development. Lectures set the problem from an industry perspective and present tools, mainly geostatistical, for data integration and flow modeling.

2-3 units (Deutsch) not given 1997-98

165. Geochronology—(Same as Geological and Environmental Sciences 165.) The principles of geochronology and thermochronology and their application to geological and geophysical problems. Topics: nuclear structure, isotope systematics, decay schemes for the principal nuclides used in earth sciences, equilibrium and disequilibrium, diffusion and transport phenomena, blocking (closure) of isotopic and magnetic systems, creation and annealing of fission tracks, neutron activation, a review of geologic timescales, chronostratigraphy, magnetostatigraphy, and cosmogenic exposure ages. Alpha counting, mass spectrometry by gas source, solid source, ion probe and accelerator methods. Fundamentals of K-Ar, Ar-Ar, Rb-Sr, U-Pb fission track and cosmogenic isotope methods. Recommended: undergraduate training in calculus, chemistry, geology, and physics.
3 units, Spr (McWilliams)

170. Environmental and Geotechnical Geophysics—Utilization of geophysical techniques, seismic reflection and refraction, gravity, magnetics, electromagnetics, resistivity and ground penetrating radar for problems related to environmental cleanup, civil engineering and siting of critical facilities. Surface-based and well-logging methods. GER:2b (DR:6)
3 units (Harris)
alternate years, given 1998-99

174. Seismology—Introduction to earthquakes and seismic wave propagation. Topics: principles of
seismographs, seismicity, earthquake magnitude and energy, construction of travel-time tables, general theory of elastic waves, interpretation of seismograms, determination of earthquake source mechanisms, and seismicity. Lab experience in computer analysis of seismological data.

3 units, Aut (Klemperer, Kovach)

182. Reflection Seismology—Principles of seismic reflection profiling, focusing on methods of seismic data acquisition and seismic data processing for hydrocarbon exploration.

3 units, Aut (Klemperer)

183. Interpretation of Seismic Reflection Profiles—Lectures and workshops on structural and stratigraphic interpretation of seismic reflection data emphasizing hydrocarbon traps in two and three dimensions on industry data, including workstation-based interpretation. Lectures only=1 unit. Prerequisite: 182, or consent of instructor.

1-4 units, Win (Klemperer, Graham)

184. Seismic Data Processing—Workshop experience in computer processing of seismic reflection data. Students individually process a commercial seismic reflection profile from field tapes to migrated stack, using interactive software on a workstation. Prerequisite: consent of instructor.

3 units, Spr (Klemperer)

185A, D, E, G, H, J, K, L, M, S, T, V, Y. Research Seminars—Limited to Geophysics undergraduates and coterminal master candidates. Opportunity for undergraduates to participate directly in an ongoing research project: experimental and computational work, joining in reading and study groups, giving seminar papers, and doing original research for the undergraduate thesis. Prerequisite: consent of instructor.

1-2 units, Aut, Win, Spr (Biondi, Claerbout)

185D. Research Seminar: Topics in Crustal Fluids—Research in interdisciplinary problems involving the state and movement of fluids in the earth’s crust. Content varies each quarter.

1-2 units, Aut, Win, Spr (Nur)

185E. Research Seminar: Tectonics—Research topics on the origin, major structures, and tectonic processes of the earth’s crust. Emphasis is on use of deep seismic reflection and refraction data.

1-2 units, Aut, Win, Spr (Klemperer, Sleep, Thompson)


1-2 units, Aut, Win, Spr (Sleep)


1-2 units, Aut, Win, Spr (McWilliams)


1-2 units, Aut, Win, Spr (Zoback)

185L. Research Seminar: Seismotectonics—Research using seismic reflection and other geophysical data to understand structure and processes in seismically active areas.

1-2 units, Aut, Win, Spr (Zoback)

185M. Research Seminar: Earthquake Seismology—Research on earthquake source processes and seismotectonics.

1-2 units, Aut, Win, Spr (Beroza)

185S. Research Seminar: Seismic Tomography—Current research in transmission and reflection tomography including topics on forward modeling, inversion, and data acquisition.

1-2 units, Aut, Win, Spr (Harris)

185T. Research Seminar: Crustal Deformation and Fault Mechanics—Current research in crustal deformation with application to active tectonic and volcanic processes. The mechanics of faulting, fracture mechanics, friction, models of strain accumulation and post-seismic deformation, pore fluids, and induced seismicity.

1-2 units, Aut, Win, Spr (Segall)

185V. Research Seminar: Poroeelasticity—Few problems in crustal geophysics are independent of pore spaces, pore fluids, and rock-fluid interactions. Current research topics on the mechanical properties of porous rocks: dynamic problems of seismic velocity, dispersion, and attenuation; and quasi-static problems of faulting, fluid transport, crustal deformation, and loss of porosity. Covers published papers and current research. Participants define, investigate, and present an original problem of their own.

1-2 units, Aut, Win, Spr (Mavko)

190. General Geophysics—Elementary study of gravitational magnetic, seismic, and thermal properties of the earth. Measurements, interpretation, applications to earth structure and exploration. Lab on field measurements of gravity anomalies, magnetic anomalies, and seismic velocity. Prerequisites: consent of instructor.
sites: calculus, first-year college physics. Recommended: Geological and Environmental Sciences 110.

3-4 units, Aut (Sleep)

195. Terrestrial Planets—Study of the available data of geology, volcanology, petrology, geodesy, heat flow, high pressure lab work, seismology, and solid state physics for developing up-to-date understanding of the properties and processes of the interiors of the terrestrial planets. Emphasis is on current unresolved problems, including the formation of the planets and their thermal histories.

2-3 units (Sleep)

196. Introduction to GIS: ARC and ERMA—(Same as Geological and Environmental Sciences 196.) Hands-on experience with ESRI’s ARC/INFO or Intergraph’s ERMA commercial GIS packages. Topics: setting up geographic databases and manipulating spatial data, including database query and analysis. Class project using a sample ARC or ERMA dataset on workstations. Guest lectures on GIS applications in environmental, geological and biological sciences, and town planning. Prerequisite: 111 or equivalent knowledge, and consent of instructor.

2 units, Win (Klemperer)

200. Fluids in the Earth’s Crust—Interdisciplinary problems involving the state and movement of fluids in the earth’s crust: basics of the coupling in porous rocks between chemical transport, fluid flow, deformation and stress, and waves; applications to gas hydrates under the oceans; reservoir geophysics; geophysical recovery monitoring; aquifer geophysics; pore pressure in faulting and aftershocks and in the earth’s crust; permeability from seismic; viscoelastic rebound; pore fluids and subduction; from sediment transport to seismic reflection; pressure solution and stylolites. Prerequisite: consent of instructor.

3 units, Spr (Nur)

202. Reservoir Geomechanics—Basic principles of rock mechanics and the state of stress and pore pressure in sedimentary basins related to exploitation of hydrocarbon and geothermal reservoirs. Mechanisms of hydrocarbon migration, exploitation of fractured reservoirs, reservoir compaction and subsidence, hydraulic fracturing, utilization of directional and horizontal drilling to optimize borehole stability, minimization of sand production.

3 units, Win (Zoback)

205. Honors Program—Experimental, observational, or theoretical honors project and thesis in geophysics under supervision of a faculty member. Students who elect to do an honors thesis should begin planning it no later than Winter Quarter of the junior year. Prerequisites: superior work in the earth sciences and approval of the department.

1-3 units, Aut, Win, Spr, Sum (Staff)


3-4 units, Aut (Claerbout)


2-3 units, Win (Claerbout)

215. Advanced Structural Geology and Rock Mechanics—(Same as Geological and Environmental Sciences 215.) Observational techniques, analysis methods, and theoretical foundations of structural geology, engineering geology, and rock mechanics. Computer exercises are integrated with field data to understand the role of geologic structures in the evolution of the earth’s crust (folding, faulting, flow, and fracturing of rock) and geologic hazards (earthquakes, landslides, and volcanoes). Topics: structural quantities and dimensional analysis; use of stress, strain, displacement, and velocity fields in structural analysis; concept and measurement of deformation; mechanical properties of rock (elasticity, viscosity, strength, friction, fracture toughness); cases studies of typical geologic structures using continuum mechanics. Computer labs. Prerequisites: 1, calculus, Macintosh skills.

4 units, Aut (Pollard)

216. Rock Fracture Mechanics—(Same as Geological and Environmental Sciences 216.) Theoretical and experimental principles of continuum and fracture mechanics applied to the origin and physical behavior of faults, dikes, joints, veins, solution surfaces, and other natural structures in rock. Field observations, engineering rock fracture mechanics, and the elastic theory of cracks. Role of natural fractures in brittle rock deformation, fluid flow, and heat transport in the earth’s crust with applications to crustal deformation and tectonophysics, structural geology, petroleum geology and engineering, and hydrogeology. Prerequisites: 215 or equivalent.

3-4 units, Spr (Pollard)

alternate years, not given 1998-99

220. Frontiers of Geophysical Research at Stanford—Required of new students entering the department. Second year and other graduate students may attend either for credit or as auditors. Series of lectures by the faculty and senior research staff in the department, introducing the frontiers of research problems and methods being employed or developed in the department and unique to department faculty and students (what the current research is.
why the research is important, what methodologies and technologies are being used, and what the potential impact of the results might be.

2 units, Aut (Nur, Farrell)

230. Advanced Topics in Well Logging—(Same as Petroleum Engineering 230.) Designed to follow a course in standard well logging, and assumes knowledge of standard practice and application of geophysical well logs. State-of-the-art tools and analyses; the technology, rock physical basis, and applications of each measurement. Hands-on computer-based analyses illustrate instructional material. Prerequisite: Petroleum Engineering 130 or equivalent. Recommended: 131.

3 units, Win (Lindblom, Moos)

242. Theoretical Ecology—(Enroll in Biology 242.)

3 units, Aut (Roughgarden)

alternate years, not given 1998-99

251. Fundamentals of Linear Wave Phenomena—Topics on wave propagation and scattering for acoustics and electromagnetics. Emphasis is on developing a basic understanding of scalar wave phenomena in homogeneous and practical applications of waves in heterogeneous Earth media. Topics: derivations of the fundamental wave equations for homogeneous and inhomogeneous media, solutions in one, two, and three dimensions, dispersive and nondispersive waves, group and phase velocity, attenuation, invariant embedding for layered media, the Bremmer, Born, and Rytov Series, and waves in random media. Prerequisites: differential/integral calculus and complex functions.

3 units, Spr (Harris)

alternate years, not given 1998-99


3 units, Win (Mavko)

280. 3-D Reflection Seismology—Principles of imaging complex structures in the Earth subsurface by use of 3-D reflection seismology. Emphasis is on processing methodologies and algorithms, with examples of applications to field data. Topics: acquisition geometries of land and marine 3-D seismic surveys, time vs. depth imaging, prestack Kirchhoff migration, dip moveout, zero-offset downward continuation, full separation and splitting, migration velocity analysis, velocity model building, imaging irregularly sampled and aliased data. Computer laboratories involve some programming.

1-2 units, Spr (Biondi)

283. Geophysical Inverse Problems—Fundamental concepts of inverse theory with application to geophysics. Inverses with discrete and continuous models, generalized matrix inverses, resolving kernels, regularization, use of prior information, singular value decomposition, nonlinear inverse problems, back-projection techniques, and linear programming. Application to seismic tomography, earthquake location, migration, and fault slip estimation. Prerequisite: Math. 103.

3 units (Beroza, Segall)

alternate years, given 1998-99

285. Earth Soundings Analysis—Convolution, spectra, discrete Fourier transform, Z-plane, feedback, adjoint operators, model fitting by least squares, time series analysis, missing data restoration, phase, resolution and random signals, signal entropy.

3 units, Win (Claerbout)

alternate years, not given 1998-99

287. Earthquake Seismology—Topics: basic theorems in elastodynamics, Green's functions, attenuation, wave propagation in layered media, ray theory, seismic moment tensors, finite-source effects, kinematics and dynamics of earthquakes, engineering aspects of seismology.

3 units (Beroza)

alternate years, given 1998-99

288. Crustal Deformation—Collection, reduction, and analysis of crustal deformation measurements for the study of relative plate motions, plate boundary deformation, earthquake and volcanic processes, post-glacial rebound, and land subsidence. Mechanical models of faulting and magmatic deformation, coupled fluid flow and deformation, and inverse methods for analyzing data.

3 units, Spr (Segall)

alternate years, not given 1998-99

289. Global Positioning System in Earth Sciences—Basics of GPS, emphasizing monitoring crustal deformation with a precision of millimeters over baselines tens to thousands of kilometers long. Applications: mapping with GIS systems, airborne gravity and magnetic surveys, marine seismic and geophysical studies, mapping atmospheric temperature and water content, measuring contemporary plate motions, and deformation associated with active faulting and volcanism.

3 units (Segall)

alternate years, given 1998-99


3 units (Zoback)

alternate years, not given 1998-99

296. Introduction to GIS: ARC/INFO and Intergraph—(Same as Geological and Environmental Sciences 296.) For graduate students; see 196.

355. Imaging Radar and Applications—(Enroll in Electrical Engineering 355.)

3 units, alternate years, given 1998-99
SCHOOL OF EARTH SCIENCES


380A. 1 unit, Aut (Klemperer)
380B. 1 or 3 units, Aut (Klemperer)

385A,D,E,G,H,I,K,L,M,S,T,V,Y. Research Seminars—Opportunity for advanced graduate students to frame and pursue research or thesis research within the context of one of the ongoing research projects in the department, and present thesis research progress reports before a critical audience on a regular basis. Prerequisite: consent of the instructor.

385A. Research Seminar: Reflection Seismology—See 185A.
   1-2 units, Aut, Win, Spr (Biomdi, Claerbout)
385D. Research Seminar: Topics in Crustal Fluids—See 185D.
   1-2 units, Aut, Win, Spr (Nur)
385E. Research Seminar: Tectonics—See 185E.
   1-2 units, Aut, Win, Spr (Klemperer, Sleep, Thompson)
385G,H. Research Seminar: Earthquake Seismology and Global Tectonics—See 185G,H.
   1-2 units, Aut, Win, Spr (Sleep)
385J. Research Seminar: Paleomagnetism, Geochronology, and Tectonics—See 185J.
   1-2 units, Aut, Win, Spr (McWilliams)
385K. Research Seminar: Borehole Geophysics—See 185K.
   1-2 units, Aut, Win, Spr (Zoback)
385L. Research Seminar: Seismotectonics—See 185L.
   1-2 units, Aut, Win, Spr (Zoback)
385M. Research Seminar: Earthquake Seismology—See 185M.
   1-2 units, Aut, Win, Spr (Beroza)
385S. Research Seminar: Seismic Tomography—See 185S.
   1-2 units, Aut, Win, Spr (Harris)
385T. Research Seminar: Crustal Deformation and Fault Mechanics—See 185T.
   1-2 units, Aut, Win, Spr (Segall)
385V. Research Seminar: Poroelasticity—See 185V.
   1-2 units, Aut, Win, Spr (Mavko)
385Y. Seminar in Theoretical Ecology—(Same as Biology 384.) Discussions of recent and classical research papers in ecology, and presentation of work in progress by seminar participants. Prerequisite: consent of instructor.
   1-3 units, Spr (Roughgarden)

397. Introduction to Contemporary Geophysics—Required of all first-year graduate students. Seminar on current topics of interest in geophysics emphasizing active research within the department and at other institutions.
   1 unit, Aut, Win, Spr (Staff)

399. Teaching Experience in Geophysics—On-the-job training in the teaching of geophysics. An opportunity to develop problem sets and lab exercises, grade papers, and give occasional lectures under the supervision of the regular instructor of a geophysics course. Regular conferences with instructor and with students in the class provide the student teacher with feedback about effectiveness in teaching.
   2-4 units, any quarter (Staff)

400. Research in Geophysics
   any quarter (Staff)

PETROLEUM ENGINEERING

Emeriti: (Professors) William E. Brigham (on active duty), Sullivan S. Marsden, Jr., Frank G. Miller; (Consulting Professors) Alvah J. Horn, Marshall B. Standing
Chair: Roland N. Horne
Associate Chair: Thomas A. Hewett
Associate Professor: Martin J. Blunt
Assistant Professor: Anthony R. Kovscek
Associate Professor (Research): Clayton V. Deutsch
Courteous Professors: Stephan A. Graham, George M. Homsy
Consulting Assistant Professor: Jane Woodward

* Joint appointment with Geological and Environmental Sciences

Petroleum engineers are concerned with the design of processes for hydrocarbon recovery from oil and gas reservoirs. Included in the design process are characterizing the spatial distribution of reservoir properties, drilling wells, designing and operating production facilities, selecting and implementing methods for enhancing fluid recovery, predicting recovery process performance, monitoring reservoirs, and examining environmental aspects of petroleum exploration and production. Given the complex and changing nature
of the problems involved, the Department of Petroleum Engineering curriculum provides a sound background in basic sciences and their application to practical problems. Course work includes fundamentals of chemistry, computer science, engineering, geology, geophysics, mathematics, and physics. Applied courses cover most aspects of petroleum engineering and some related fields like geothermal engineering and geostatistics. The curriculum emphasizes the fundamental aspects of fluid flow in the subsurface. These principles apply equally well to optimizing oil recovery from petroleum reservoirs and remediating contaminated groundwater systems.

Faculty and graduate students in the department conduct research in a variety of areas including: enhanced oil recovery by thermal means, gas injection, and the use of chemicals; reservoir simulation using computer models; geostatistical reservoir characterization and mathematical modeling; well test analysis; flow of fluids in pipes; natural gas engineering; optimization; properties of petroleum fluids; and geothermal engineering. Undergraduate students are encouraged to participate in research projects. Graduate programs lead to the degrees of Master of Science (M.S.), Engineer, Engineer with Management Option, and Doctor of Philosophy (Ph.D.) in Petroleum Engineering.

M.S., Engineer, and Ph.D. degrees may be awarded with field designations for students who follow programs of study in the fields of geostatistics, geothermal or crustal fluids.

The department occupies portions of the Green Earth Sciences Building and it operates laboratories for research in various enhanced oil recovery processes and geothermal engineering. Students have access to a variety of computers for research and course work. Computers available for instruction and research include 13 UNIX workstations and two multiprocessor WinDD servers within the department as well as extensive campus-wide computer clusters. Each graduate student office has at least one X-terminal per student.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

The four-year program leading to the B.S. degree provides a foundation for careers in many facets of the energy industry. The curriculum includes basic science and engineering courses that provide depth sufficient for a wide spectrum of careers in the energy and environmental industries.

One of the goals of the program is to provide experience integrating the skills developed in individual courses to address a significant design problem. In Petroleum Engineering 180, taken in the senior year, student teams design facilities for a real petroleum reservoir to meet specific management objectives.

COURSE PROGRAM

The requirements for the B.S. degree in Petroleum Engineering are similar to those described in the "School of Engineering" section of this bulletin. Students must satisfy the University general education, writing, and language requirements. The normal Petroleum Engineering undergraduate program automatically satisfies the University General Education Requirements (GERs) in area 2a (Natural Sciences), area 2b (Technology and Applied Sciences), and area 2c (Mathematics). Engineering fundamentals courses and petroleum engineering depth and elective courses should be taken for a letter grade.

In brief, the credit and subject requirements are:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Minimum Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>21</td>
</tr>
<tr>
<td>Science</td>
<td>26</td>
</tr>
<tr>
<td>Engineering fundamentals</td>
<td>25</td>
</tr>
<tr>
<td>Petroleum engineering depth</td>
<td>39-40</td>
</tr>
<tr>
<td>General Education, writing, language, and electives</td>
<td>68-69</td>
</tr>
<tr>
<td>Total</td>
<td>180</td>
</tr>
</tbody>
</table>

The following courses constitute the normal program leading to a B.S. in Petroleum Engineering. The program may be modified to meet a particular student's needs and interests with the adviser's approval.

MATHEMATICS

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. 41. Single Variable Calculus</td>
<td>5</td>
</tr>
<tr>
<td>and Math. 42. Single Variable Calculus</td>
<td>5</td>
</tr>
<tr>
<td>Math. 19. Calculus</td>
<td>3</td>
</tr>
<tr>
<td>and Math. 20. Calculus</td>
<td>3</td>
</tr>
<tr>
<td>and Math. 21. Calculus</td>
<td>4</td>
</tr>
<tr>
<td>Math. 43. Calculus of Several Variables</td>
<td>5</td>
</tr>
<tr>
<td>Math. 44. Calculus</td>
<td>3</td>
</tr>
<tr>
<td>Math. 130. Ordinary Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>or Mech. Engr. 100. Differential Equations in Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
</tr>
</tbody>
</table>

SCIENCE

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
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<tbody>
<tr>
<td>Chem. 31. Chemical Principles</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 33. Structure and Reactivity</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 171. Physical Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 1. Fundamentals of Geology</td>
<td>5</td>
</tr>
<tr>
<td>Physics 41. Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>Physics 43. Electricity</td>
<td>3</td>
</tr>
<tr>
<td>Physics 45. Magnetism</td>
<td>3</td>
</tr>
<tr>
<td>Physics 46. Electricity and Magnetism Laboratory</td>
<td>1</td>
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<td>Total</td>
<td>26</td>
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ENGINEERING FUNDAMENTALS

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comp. Sci. 106A. Programming Methodology</td>
<td>5</td>
</tr>
<tr>
<td>or Comp. Sci. 106X. Programming Methodology and Abstractions</td>
<td>5</td>
</tr>
</tbody>
</table>
and Engr. 15. Dynamics 5
Engr. 30. Engineering Thermodynamics 3
Mech. Engr. 33. Introductory Fluids Engineering 4
Pet. Engr. 167. Engineering Valuation of Oil and Gas Wells 3
or Engr. 60. Engineering Economy 3
Total 25

* Students in junior- and senior-level petroleum engineering courses are assumed to have competence in a high-level language such as FORTRAN or C.

ENGINEERING DEPTH

The following courses constitute the core program in Petroleum Engineering:
Chem. Engr. 140. Fluid Mechanics 3
or Chem. Engr. 160. Chemical Engineering Plant Design 3
Chem. Engr. 180A. Chemical Engineering Laboratory 3
Chem. Engr. 180B. Chemical Engineering Laboratory 2
Geol. & Envir. Sci. 111. Structural and Engineering Geology I 3
Geol. & Envir. Sci. 151. Sedimentary Geology and Petrography: Depositional Systems 4
Pet. Engr. 120. Reservoir Engineering 3
Pet. Engr. 130. Well Log Analysis I 3
Pet. Engr. 140. Drilling and Completion Technology 3
Pet. Engr. 175. Well Test Analysis 3
Pet. Engr. 260. Groundwater Pollution and Oil Spills 3
Total ................................................................. 39-40

A list of suggested electives and sample course programs are available in the Department of Petroleum Engineering, room 65, Green Earth Sciences Building. It is important to start mathematics courses in the first year and engineering and geology early in the second year. Computers are used extensively in most petroleum engineering courses. Students must develop programming skills through appropriate course work and self-study and are expected to achieve fluency in the use of FORTRAN, C, or C++ by their junior year.

MINORS

To be recommended for a B.S. degree with Petroleum Engineering as a minor subject, a student must take the following courses in addition to those required by the major department or program: Petr. Eng. 120, 121, 130, 175, 180; Geol. & Envir. Sci. 111 and 151. In some programs, Geol. & Envir. Sci. 111 or 151 may also satisfy major requirements.

HONORS PROGRAM

A limited number of undergraduates may be admitted to the honors program at the beginning of their senior year.

To be admitted, the student must have a grade point average (GPA) of at least 3.0 in all course work in the University. In addition to the minimum requirements for the B.S. degree, the student must complete 6 units of advanced petroleum engineering courses and at least 3 units of research (Pet. Engr. 193).

Students who wish to be admitted to the honors program should consult with their advisor before the start of their senior year. Those who do not meet all of the formal requirements may petition the department for admission. Those completing the program receive the B.S. degree in Petroleum Engineering with Honors. An overall 3.5 GPA is required in all petroleum engineering courses for graduation with honors.

COTERMINAL B.S. AND M.S. PROGRAM

A Stanford undergraduate majoring in engineering or earth sciences may apply to work simultaneously toward bachelor's and master's coterminal degrees under terms indicated in the introductory material for the School of Earth Sciences.

The applicant's petition must provide evidence of strong academic performance. The petition is evaluated by the graduate admissions committee of the department. Applicants must take the Graduate Record Examination (GRE). Typically, at least a 3.25 GPA in engineering, science, and mathematics, and a 3.0 GPA overall, is expected. Students seeking a B.S. in an engineering field other than petroleum engineering, and an M.S. in Petroleum Engineering should plan to take petroleum engineering and geology undergraduate requirements as a portion of the engineering breadth requirement for the undergraduate degree.

GRADUATE PROGRAMS

The energy industry provides a variety of employment opportunities for petroleum engineers with advanced training. A balanced master's degree curriculum including both engineering course work and research requires a minimum of one full-time academic year beyond the baccalaureate. An alternative master's degree program based only on course work is available. Students who anticipate continuing in the Ph.D. program should follow the research option.

The degree of Engineer requires a comprehensive full-time two-year program of graduate study. This degree permits more extensive course work than the master's degree with an emphasis on professional practice.

The degree of Engineer (Management Option) requires two years of full-time graduate study combining engineering and business administration. This program is conducted in cooperation with the Graduate School of Business and the School of Engineering.
The Ph.D. degree is awarded primarily on the basis of completion of significant, original research. Extensive course work and a minimum of three full-time years of graduate work beyond the master's degree is required. Doctoral candidates planning theoretical work are encouraged to gain experimental research experience in the M.S. program.

In special cases, the M.S., Engineer, and Ph.D. degrees may be awarded with field designations for students who follow programs of study in the particular fields of (a) geostatistics, (b) geothermal, or (c) crustal fluids. For example, students may be awarded the degree Master of Science in Petroleum Engineering (Geothermal).

MASTER OF SCIENCE

The objective is to prepare the student for professional work in the energy industry through completion of fundamental courses in the major field and in related sciences as well as independent research.

Students entering the graduate program are expected to have an undergraduate level petroleum engineering background. Competence in programming in a high level language (Computer Science 106X or the equivalent) and knowledge of petroleum engineering fundamentals and geological fundamentals (Pet. Engr. 120, 130, 140, and Geol. & Envir. Sci. 151) are prerequisites for taking most graduate courses.

The candidate must fulfill the following requirements:

1. Register as a graduate student for at least three quarters at full tuition or the equivalent of partial-tuition quarters.
2. Submit a Program Proposal for the Master's Degree in the first quarter of enrollment.
3. Complete 45 units with at least an average GPA of 3.0. This requirement is satisfied by taking the core sequence, selecting two of the nine additional sequences, and an appropriate number of additional courses from the list of Technical Electives. Students interested in continuing for a Ph.D. are expected to choose the Research Option and enroll in 6 units of Pet. Engr. 360. All courses must be taken for a letter grade.
4. Students entering without an undergraduate degree in Petroleum Engineering must make up deficiencies in previous training; not more than 10 units of such work may be counted as part of the minimum total of 45 units.

Research subjects include oil and gas recovery, reservoir engineering, reservoir characterization and modeling, production optimization, reservoir simulation, transient well test analysis, flow of non-Newtonian fluids, geothermal energy, natural gas engineering, energy industry management, pipeline transportation, and certain groundwater hydrology and environmental problems.

RECOMMENDED COURSES AND SEQUENCES

The following list is recommended for most students. With the consent of the student's adviser, courses listed under technical electives may be substituted based on interest or background.

CORE SEQUENCE

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mech. Engr. 200A. Mathematical &amp; Computational Methods in Mechanical Engineering†</td>
<td>3</td>
</tr>
<tr>
<td>Mech. Engr. 200B. Mathematical &amp; Computational Methods in Mechanical Engineering†</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 175. Well Test Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 222. Reservoir Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 246 Reservoir Characterization and Flow Modeling with Outcrop Data</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 251. Thermodynamics of Phase Equilibrium*</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
</tr>
</tbody>
</table>

* Optional for students taking the Geostatistics and Reservoir Modeling sequence.
† Math 220 A,B,C may be substituted with adviser's approval.

ELECTIVE SEQUENCES

Choose two of the following:

Crustal Fluids:

- Geol. & Envir. Sci. 230. Physical Hydrogeology | 5 |
- Geol. & Envir. Sci. 231. Contaminant Hydrogeology | 4 |

Total | 12 |

Economics and Risk Analysis:

- Pet. Engr. 247. Oil Field Exploration and Development | 3 |
- Pet. Engr. 248. Risk Analysis in Oil Exploration | 3 |

Total | 9 |

Enhanced Recovery:

- Pet. Engr. 225. Miscible Flooding | 3 |

Total | 9 |

Geostatistics and Reservoir Modeling:

- Geophys. 182. Reflection Seismogy | 3 |
- Pet. Engr. 240. Geostatistics for Spatial Phenomena | 3-4 |
- Pet. Engr. 241. Practice of Geostatistics | 3-4 |

Total | 9-11 |

Geothermal:

- Pet. Engr. 269. Geothermal Reservoir Engineering | 3 |

Total | 10 |

Reservoir Performance:

- Pet. Engr. 180. Field Development | 3-4 |
- Pet. Engr. 223. Reservoir Simulation | 3-4 |

Total | 9-11 |
Simulation and Optimization:
- Pet. Engr. 223. Reservoir Simulation
- Pet. Engr. 284. Optimization

Research:

Total units required for M.S. degree: 45

TECHNICAL ELECTIVES

With the consent of the adviser, technical electives from the following list of advanced-level courses may be substituted for courses listed above.

- Geophys. 182. Reflection Seismology
- Geophys. 190. General Geophysics
- Pet. Engr. 130. Well Log Analysis
- Pet. Engr. 211. Computer Applications for Petroleum Engineers
- Pet. Engr. 267. Valuation and Appraisal of Oil Reservoirs
- Pet. Engr. 269. Geothermal Reservoir Engineering
- Pet. Engr. 272. Gas Engineering
- Pet. Engr. 281. Applied Mathematics in Reservoir Engineering
- Pet. Engr. 282. Capillary and Interfacial Phenomena
- Pet. Engr. 284. Optimization

ENGINEER

The objective is to broaden training through additional work in engineering and related sciences and by additional specialization.

A minimum of two years (six full quarters) of graduate study is required. The candidate must complete 90 units of course work including 15 units of research (Pet. Engr. 360), and including all course requirements of the department’s master’s degree (39 units, excluding research). If the candidate has received credit for research in the M.S. degree, this credit ordinarily would be transferable to the Engineer degree, in which case a total of 9 additional research units would be required. No more than 10 of the required 90 units may be applied to overcoming deficiencies in undergraduate training. The candidate is required to take a minimum of 36 units of business courses. A list of suggested courses is available in the Department of Petroleum Engineering office.

Additional units needed to complete the required 90 may be electives. The student must secure at least “Pass” grades in business courses. All other courses must be taken for a letter grade. The student must maintain an average GPA of at least 3.0. The student must submit a thesis on a combined engineering and economic study representing 15 units of research. The thesis must have the approval of the adviser, another faculty member, and the University Committee on Graduate Studies.

MANAGEMENT OPTION

The objective is to broaden the student’s training in professional engineering and to provide a background in business administration.

A minimum of two years (six full quarters) of graduate study is required. The candidate must complete 90 units of course work, including 15 units of research (Pet. Engr. 360), and including all course requirements of the department’s master’s degree (39 units, excluding research). If the candidate has received credit for research in the M.S. degree, this credit ordinarily would be transferable to the Engineer degree, in which case a total of 9 additional research units would be required. No more than 10 of the required 90 units may be applied to overcoming deficiencies in undergraduate training. The candidate is required to take a minimum of 36 units of business courses. A list of suggested courses is available in the Department of Petroleum Engineering office.

Additional units needed to complete the required 90 may be electives. The student must secure at least “Pass” grades in business courses. All other courses must be taken for a letter grade, and the student must maintain an average GPA of at least 3.0. The student must submit a thesis on a combined engineering and economic study representing 15 units of research. The thesis must have the approval of the adviser, another faculty member, and the University Committee on Graduate Studies.

DOCTOR OF PHILOSOPHY

The Ph.D. degree is conferred upon demonstration of high achievement in independent research and by presentation of the research results in a written dissertation and oral defense.

A minimum of three years (nine full quarters) of graduate study must be completed satisfactorily. The student is expected to take at least 72 units beyond the 45 units required for the master’s degree. The 72 units are composed of 36 units of research and 36 units of course work. The specification of 36 units of course work is a minimum; in some cases the research adviser may specify additional requirements to strengthen the student’s expertise in particular areas. The 36 units of course work does not include teaching experience (Pet. Engr. 359), which is a requirement for the Ph.D. degree, or any units in research seminars, which students are required to attend. All courses must
be taken for a letter grade, with an average GPA of at least 3.25 in the 36 units of course work. The 36 units of course work may include graduate courses in petroleum engineering (numbered 200 and above) and courses selected from the following list. Other courses may be approved by the adviser. In general, non-technical courses are not approved.

### MATH AND APPLIED MATH

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aero. &amp; Astro. 210A. Fundamentals of Compressible Flow</td>
<td>3</td>
</tr>
<tr>
<td>Aero. &amp; Astro. 214A. Numerical Methods in Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>Aero. &amp; Astro. 214B. Numerical Computation of Compressible Flow</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 220. Applied Mathematics in Chemical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Comp. Sci. 106X. Programming Methodology and Abstractions</td>
<td>5</td>
</tr>
<tr>
<td>Comp. Sci. 138A. Numerical Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Comp. Sci 138B. Numerical Solution of Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>Comp. Sci. 193D. C++ and Object Oriented Programming</td>
<td>4</td>
</tr>
<tr>
<td>Comp. Sci. 193U. Software Engineering in C</td>
<td>3</td>
</tr>
<tr>
<td>Math. 106. Introduction to Theory of Functions of a Complex Variable</td>
<td>3</td>
</tr>
<tr>
<td>Math. 113. Linear Algebra and its Applications</td>
<td>3</td>
</tr>
<tr>
<td>Math. 114. Linear Algebra and Matrix Theory</td>
<td>3</td>
</tr>
<tr>
<td>Math. 115. Fundamental Concepts of Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Math. 131. Partial Differential Equations—I</td>
<td>3</td>
</tr>
<tr>
<td>Math. 132. Partial Differential Equations—II</td>
<td>3</td>
</tr>
<tr>
<td>Stat. 110. Statistical Methods in Engineering and Physical Sciences</td>
<td>4</td>
</tr>
<tr>
<td>Stat. 201. Statistical Methods</td>
<td>3</td>
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</table>

### SCIENCES

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
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</thead>
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<tr>
<td>Geol. &amp; Envir. Sci. 231. Contaminant Hydrogeology</td>
<td>4</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 247. Oil Field Exploration and Development</td>
<td>3</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 253. Petroleum Geology</td>
<td>3</td>
</tr>
</tbody>
</table>

Ph.D. students are required to take the doctoral qualifying examination at the beginning of the second year of study. Students receiving a master's degree from the Department of Petroleum Engineering and continuing on for a Ph.D. are required to take the qualifying examination at the first opportunity after the completion of the requirements for the master's degree.

The qualifying examination consists of both a written and an oral section. The written part consists of three or four three-hour examinations on different subjects. The oral part is a three-hour examination in which the student is questioned by members of the department faculty. Students are required to apply for candidacy for the Ph.D. degree after passing the department's qualifying examination.

Within a year of passing the qualifying examination, the student must prepare a short written report that contains a literature review and a research proposal. This proposal must be approved after oral examination by a committee made up of the student's adviser and two other faculty, one of whom must be from the department.

The student's record must indicate outstanding scholarship. The student must pass the department's qualifying examination, submit an approved research proposal, fulfill the requirements of the minor department if a minor is elected, and pass the University oral examination, which is a defense of the dissertation. The student must prepare a dissertation based on independent research and that makes a significant contribution to the field.

The dissertation must be submitted in its final form within five calendar years from the date of admission to candidacy by the University Committee on Graduate Studies. Candidates who fail to meet this deadline must submit an "Application for Extension of Candidacy" for approval by the department chair if they wish to continue in the program.

### Ph.D. MINOR

To be recommended for a Ph.D. degree with Petroleum Engineering as a minor subject, a student must take 20 units of selected graduate-level lecture courses in the department. These courses must include Pet. Engr. 221 and 222. The re-
remaining courses should be selected from Pet. Engr. 175, 180, 223, 224, 225, 226, 275, 281, 282, and 284.

**COURSES**

(WIM) indicates that the course meets the Writing in the Major requirements.

(AU) indicates that the course is subject to the University Activity Unit limitations (8 units maximum).

103. Energy Resources—Overview of oil, natural gas, coal, nuclear, hydro, solar, geothermal, biomass, wind, and ocean energy resources in terms of supply, distribution, recovery and conversion, environmental impacts, economics, policy, and technology. Opportunities for energy efficiency, electric power basics, the changing role of electric utilities, transportation basics, and energy use in developing countries. Field trip participation required. Recommended: Civil Engineering 170. GER:2b (DR:6)

3 units, Spr (Woodward)

104. Seminar: The Coming Energy Revolution—Explores three forces driving an energy revolution: environmental pressures, global social and economic revolution, and technological change. Assessment of evolution vs. revolution, developed vs. developing countries, transportation, electric power, resource development and extraction, end use technologies, deregulation, privatization and globalization, barriers to change and assessment of the mechanisms to overcome them. Enrollment limited to 15; presentations every class. Prerequisite: 103.

3 units (Woodward) not given 1997-98

110. Stanford Introductory Seminar: Soap Bubbles, Raindrops, and Inkjets—Preference to sophomores. The behavior of bubbles and drops whose shapes are controlled by surface tension. Readings of Newton, Young, Laplace, and Plateau show how thinking about curved surfaces occupied scientists and mathematicians of the 18th and 19th centuries. A mathematical picture of a curved surface permits prediction of the shape of a bubble surface, and the integrations and pictures of the surface. Physical manifestations of these curved liquid surfaces: distribution of raindrops on a spider web, why sand grains stick together when damp, how the effects of surface tension work in an inkjet printer, why it is hard to remove oil and grease from clothes, and how detergent works.

3 units (Orr) alternate years, given 1998-99

120. Fundamentals of Petroleum Engineering—(Same as Engineering 120.) Lectures, problems. Basic topics involved in petroleum engineering: petroleum discovery and recovery; and the origin, discovery, and development of oil and gas. Chemical, physical, and thermodynamic properties of oil and natural gas. Material balance equations and reserve estimates using volumetric calculations.

Gas laws. Single-phase and multiphase flow through porous media.

3 units, Aut (Horne)

121. Fundamentals of Multiphase Flow—See 221.

3 units, Win (Blunt)

130. Well Log Analysis—For earth scientists and engineers. Interdisciplinary, providing a practical understanding of the interpretation of well logs using real field examples. Lectures, problems. Methods for evaluating the commercial significance of rock formations penetrated in exploratory drilling. Concentrates on the fundamentals of all types of logs including electric and nonelectric logs.

3 units, Aut (Lindblom)

140. Drilling and Completion Technology—Principles applied to the drilling and completion of oil, gas, and geothermal wells for off- and onshore operations. Rig mechanics, drilling fluid technology (drilling hydraulics, clay chemistry, and pressure control), cementing technology, bit mechanics, casing design, and directional drilling.

3 units (Staff) not given 1997-98

150. Interdisciplinary Aspects of Reservoir Management—(Same as Geophysics 155.) Survey of reservoir characterization steps needed for optimal reservoir management: problem areas and avenues of development. Lectures set the problem from an industry perspective and present tools, mainly geostatistical, for data integration and flow modeling.

2-3 units (Deutsch) not given 1997-98

155. Undergraduate Report on Energy Industry Training—Provides on-the-job practical training under the guidance of experienced, on-site supervisors geared to undergraduate level students. A concise report detailing work activities, problems, assignments and key results is required. Prerequisite: written consent of instructor

1 unit, any quarter (Staff)


3 units, Win (Kourt)

alternate years, not given 1998-99

172. Natural Gas Engineering—(Same as Engineering 121.) See 272.

3 units (Aziz) not given 1997-98


3 units, Aut (Horne)

180. Field Development Design—All phases of the development of oil and gas fields, emphasizing design criteria. Inflow performance, analysis of reservoir and production systems, well design and
simulation, artificial lift, surface facilities, and multidisciplinary approaches to field development. Project and assignments emphasize integrated production and reservoir aspects of major project design and evaluation. Prerequisites: 120, 130; and 172 or 272. (WIM)

3-4 units (Staff) not given 1997-98

192. Undergraduate Teaching Experience—Leading field trips, preparing lecture notes, quizzes under supervision of the instructor.
1-3 units, any quarter (Staff)

193. Undergraduate Research Problems—Original and guided research problems with comprehensive report.
1-3 units, any quarter (Staff)

1-3 units, any quarter (Staff)

200. Fluids in the Earth's Crust—(Enroll in Geophysics 200.)
3 units, Spr (Nur)

202. Reservoir Geomechanics—(Enroll in Geophysics 202.)
3 units, Win (Zoback)

3 units (Woodward) not given 1997-98

211. Computer Applications for Petroleum Engineers—Lectures, seminars, and class projects. Provides "seed" knowledge of the software and hardware available to petroleum engineering students, effective use of computer resources, and some software tools. X-Windows, use of graphics, interlanguage communication, and user interfaces.
1 unit (Horne) not given 1997-98

3 units, Win (Blunt)

3 units, Spr (Aziz)

223. Reservoir Simulation—Lectures, problems, and class project provide a thorough understanding of the fundamentals of petroleum reservoir simulation. Development of equations for multicomponent, multiphase flow between gridblocks comprising a petroleum reservoir. Relationships between black-oil and compositional models. Various techniques for developing black-oil, compositional, thermal and dual-porosity models. Practical considerations in the use of simulators for predicting reservoir performance. Prerequisite: 221 and 246 or consent of instructor; Recommended: Mechanical Engineering 200C.
3-4 units, Win (Aziz)

224. Modeling Flow in Heterogeneous Reservoirs—Lectures, problems. Overview of characterization of reservoir heterogeneity, univariate statistics, spatial continuity measures, stochastic simulation. Dispersion in heterogeneous porous media, scale effects, fingering vs. channeling, heuristic fractional flow models. The influence of lamina scale heterogeneities, capillary cross-flow, rate dependent recoveries. Effective flow properties for coarse grid simulation, permeability averaging, permeability tensors, pseudofunctions for multiphase flow. Approximate streamtube methods for calculating flow in heterogeneous media. Flexible grid. Prerequisites: 223; and 240 or 150 (150 may be taken concurrently with 224).
3 units, Aut (Hewett)

3 units, Spr (Orr)
alternate years, not given 1998-99

3 units, Spr (Castanier)

227. Enhanced Oil Recovery—Lectures, problems. Introduction to physics, theories and methods of evaluating chemical, miscible and thermal en-
104 SCHOOL OF EARTH SCIENCES

hanced oil recovery projects. Existing methods and screening techniques described as well as analytical and simulation based means of evaluating project effectiveness. Dispersion- convection-adsorption equations, coupled heat and mass balances and phase behavior provide requisite building blocks for evaluation.

3 units Spr (Kovscek)

230. Advanced Topics in Well Logging—(Same as Geophysics 230.) Designed to follow a course in standard well logging, and assumes knowledge of standard practice and application of geophysical well logs. State-of-the-art tools and analyses; the technology, rock physical basis, and applications of each measurement. Hands-on computer-based analyses illustrates instructional material. Prerequisites: 130 or equivalent. Recommended: 131.

3 units, Win (Lindblom, Moos)

240. Geostatistics for Spatial Phenomena—(Same as Geological and Environmental Sciences 240.) Probabilistic modeling of spatial and/or time dependent phenomena. Kriging and cokriging for gridding and spatial interpolation. Integration of heterogeneous sources of information. Stochastic imaging of reservoir/field heterogeneities. Case studies from the oil industry and environmental sciences. Prerequisites: introductory calculus and linear algebra, Statistics 116 or equivalent.

3-4 units, Win (Journal)

241. Practice of Geostatistics on Exhaustive Data Bases—(Same as Geological and Environmental Sciences 241.) Data set used relates to a large N. sed reservoir and includes typical spots of hard data and more extensive soft information (seismic/geological interpretation). Student teams perform independently reservoir characterization, share results in class. Reservoir study through maps, variograms, kriging, and stochastic models. Extensive use of GSLIB and 3D visualization software. Flow simulations for recovery forecast and placement of additional wells. Prerequisites: 240, FORTRAN/UNIX; Recommended: 246

3-4 units, Spr (Journal)

242A. Topics in Advanced Geostatistics—(Same as Geological and Environmental Sciences 242A.) Conditional expectation theory and projections in Hilbert spaces; parametric vs. non-parametric geostatistics; Boolean, Gaussian, fractal, indicator, annealing approaches to stochastic imaging; Bayesian methods for data integration. Prerequisites: 240, advanced calculus, FORTRAN/Unix.

3 units (Journal) not given 1997-98

246. Reservoir Characterization and Flow Modeling with Outcrop Data—(Same as Geological and Environmental Sciences 246.) Class project designed to provide earth science students an understanding of how to use outcrop observations in quantitative geological modeling and flow simulation. Addresses a specific reservoir management problem by studying suitable outcrop analogue (weekend field trip), constructing geostatistical reservoir models, and performing flow simulation. Provides Geology, Geophysics, and Petroleum Engineering students an introduction, through an applied example, to the relationship between the disciplines. A different reservoir management question and outcrop analogue is studied each year. May be repeated for credit.

3 units (Deutsch, Graham) given 1998-99

247. Oil Field Exploration and Development—(Same as Geological and Environmental Sciences 247.) Analyzes an actual oil or gas exploration or exploitation venture that includes drilling one or more wells. Students prepare comprehensive analyses and recommendations that include interpretation of the geology, engineering specifications for wells, lease acquisition, and preparation of financial forecasts. An actual well may be drilled later based on the recommendation.

3 units, Spr (Kourt, Harbaugh) alternate years, not given 1998-99

248. Risk Analysis in Petroleum Exploration—(Same as Geological and Environmental Sciences 248.) Use of formal procedures to make optimum financial decisions in petroleum exploration and exploitation. Estimation of probabilities attached to exploration actions and their utilization in financial forecasts. Extensive use of PC-based problem sets that include a computerized exploration exercise with competing teams. Concepts are applicable to resource exploration and development in general.

3 units (Harbaugh) given 1998-99


3 units, Aut (Kovscek)

255. Report on Energy Industry Training—Provides on-the-job training for master's degree students under the guidance of experienced, on-site supervisors. Students must submit a concise report detailing work activities, problems, assignments and key results. Prerequisite: written consent of adviser.

1 unit, any quarter (Staff)

water, and air. Movement of hydrocarbons in the vadose zone and in the groundwater. Remediation and cleanup techniques: air stripping and sparging, bioremediation, steam flooding, and solvent and surfactant injection. Drilling wastes. The physical processes affecting the spread of oil slicks at sea. Methods for containing and removing the spill and cleaning of polluted beaches.

3 units, Win (Blunt)

267. Engineering Valuation and Appraisal of Oil and Gas Wells, Facilities, and Properties—Seminar, problems. Appraisal of development and remedial work on oil and gas wells; appraisal of producing properties; estimation of productive capacity, reserves; operating costs, depletion and depreciation; value of future profits, taxation, fair market value; original or guided research problems on economic topics with report. Prerequisite: consent of instructor.

3 units, Win (Kourt) alternate years, not given 1998-99

268. Seminar in Petroleum Engineering
1 unit, any quarter (Staff)


3 units (Horne) alternate years, given 1998-99


3 units (Aziz) not given 1997-98

1-3 units, any quarter (Staff)


3 units (Staff) not given 1998-99


3 units, Spr (Horne)


3 units (Staff) not given 1997-98


3 units, Spr (Horne)

285A,B,C,D,E,F,G. Research Seminars—Focused study in research areas within the department. Graduate students may participate in advanced work in areas of particular interest prior to making a final decision on a thesis subject. Prerequisite: consent of instructor.

285A. Research Seminar: Gas Injection Processes—Current research in the SUPRI-C group. (AU)
1 unit, Aut, Win, Spr (Blunt)

285B. Research Seminar: Enhanced Oil Recovery—Current research in the SUPRI-A group. Heavy oil recovery, well test methods, enhanced oil recovery. Presentation required. (AU)
1 unit, Aut, Win, Spr (Castanier, Kovscek)

285C. Research Seminar: Geothermal Reservoir Engineering—Current research in the geothermal energy. Presentation required for credit. (AU)
1 unit, Aut, Win, Spr (Horne)

285D. Research Seminar: Reservoir Simulation—Current research in SUPRI-B (Reservoir Simulation) program. (AU)
1 unit, Aut, Win, Spr (Aziz)

285E. Research Seminar: Well-Test Analysis—(AU)
1 unit, Aut, Win, Spr (Horne)
285F. Research Seminar: Geostatistics—Current research in the SCRF (Stanford Center for Reservoir Forecasting) program. (AU)
1 unit, Aut, Win, Spr (Deutsch, Journel, Hewett)

285G. Research Seminar: Horizontal Well Technology—Current research in SUPRI-HW (Productivity and Injectivity of Horizontal Wells) program. (AU)
1 unit, Aut, Win, Spr (Aziz)

355. Report on Energy Industry Training—Provides on-the-job training for doctoral students under the guidance of experienced, on-site supervisors. Students must submit a concise report detailing work activities, problems, assignments, and key results. Prerequisite: written consent of adviser.
1 unit, any quarter (Staff)

359. Teaching Experience in Petroleum Engineering—On-the-job training in teaching petroleum engineering. Student prepares and presents several lectures, problem sets, grades problems, and prepares lab experiments under the supervision of regular instructor. Performance is evaluated by students and the regular instructor.
1-3 units, any quarter (Staff)

1-9 units, any quarter (Staff)

Dean: Richard J. Shavelson

Associate Dean for Academic Affairs: Denis C. Phillips

Associate Dean for Administration: Vicki Oldberg

Associate Dean for External Relations: Patricia Nicholson


Associate Professors: Patricia J. Gumport, Teresa D. LaFromboise, David Rogosa

Assistant Professors: Brigid J. Barron, Karen L. Mundy, Robert Roeser, Melanie Sperling

Courtesies Professors: Paul Brest, Shirley Brice Heath, Herant Katchadourian, Donald Kennedy, Mark Lepper, John W. Meyer, John Rickford, W. Richard Scott

Consulting Associate Professors: Sandra L. Foster, Shelley Goldman, Charlotte Huber, Rosemarie Moore, Peter Pearson

Consulting Assistant Professors: Douglas Rait, Jerry L. Talley

Visiting Professors: Joshua Fishman, Alan Peshkin

* Recalled to active duty.

The School of Education is organized into four Program Area Committees:

Curriculum and Teacher Education (CTE)

Language, Literacy, and Culture (LLC)

Psychological Studies in Education (PSE)

Social Sciences, Policy, and Educational Practice (SSPEP)

In addition, the Stanford Teacher Education Program (STEP) has many of the features of a Program Area Committee, but does not admit doctoral students.

These committees function as administrative units that act on admissions, plan course offerings, assign advisers, and set program requirements within their areas. Various subspecialties or concentrations exist within most program areas. Faculty members are affiliated primarily with one program, but as the Areas operate flexibly faculty often participate in more than one area committee. While there is a great deal of overlap and interdisciplinary emphasis across program areas, students are affiliated with one area committee and must meet the degree requirements set by that committee.

Detailed information about admission and degree requirements, faculty members, and specializations related to these area committees can be found in the publication School of Education Guide to Graduate Programs and at http://www-leland.stanford.edu/dept/SUSE/.

OFFERINGS

The School of Education prepares scholars, teachers, teacher educators, counseling psychologists, policy analysts, evaluators, researchers, administrators, and other educational specialists. Four graduate degrees with specialization in education are granted by the University: Master of Arts, Master of Arts in Teaching (Subject), Doctor of Education, and Doctor of Philosophy. While no undergraduate majors are offered, there is an Undergraduate Honors Program and courses are available to undergraduates. The School of Education participates in the undergraduate concentration in Children and Society and provides tutoring opportunities in local school districts in
conjunction with the Haas Center. In addition, many non-teaching internships are available for master's students as well as teaching placements for STEP students. The school provides appropriate course work and programs in teaching and administration to enable it to recommend candidates to the California Commission on Teacher Credentialing for the Single Subject (secondary) Teaching Credential and the Preliminary Administrative Services Credential. California credential requirements frequently satisfy all or part of the requirements in other states. Students who have qualified for a preliminary teaching credential in California and need a fifth year of study and a university recommendation for the Professional Clear California teaching credential may satisfy this requirement in one of the University's degree programs. The Stanford Teacher Education Program (STEP) offers a master's degree along with the credential. Persons who are interested in becoming principals, central office administrators, or superintendents, and who are seeking the Preliminary Administrative Services credential, must be admitted to the Prospective Principals Program. Requirements for credentials and degree program requirements do not necessarily coincide, and students seeking a credential along with a degree must make certain that they satisfy both sets of requirements. The School of Education offers an eight-week summer session. Those who pursue a full program of study (15 units) for eight weeks may earn a full quarter of residence toward the requirement for a degree. Course offerings are covered in the Stanford University Summer Session Catalogue, 1998 issued in January. The school offers no correspondence or extension courses.

UNDERGRADUATE PROGRAMS

The School of Education focuses on graduate education and research training and does not offer an undergraduate major. However, undergraduate education is of concern to the school, and courses and programs are available to those interested in the field of education. Several courses at the 100 level are especially designed for undergraduates; and several higher-level courses are open to undergraduates. An honors program is available to undergraduates to supplement their regular majors outside the school; and in conjunction with the Haas Center, the school offers a variety of tutoring opportunities for undergraduates interested in developing educationally-oriented skills.

CHILDREN AND SOCIETY CURRICULUM

The Children and Society Curriculum is an undergraduate concentration sponsored jointly by the School of Humanities and Sciences and the School of Education for undergraduates who wish to build a concentration on education and children into their studies. See the "Children and Society Curriculum" section of this bulletin for course requirements.

HONORS PROGRAM

This program permits interested and able undergraduates at Stanford to build on the training received in their major field of study by pursuing additional courses and a research or practicum project in a related area of education. Students apply for entry during the junior year. At least one course must be taken from each of the following areas:

1. Educational policy and history in the U.S.: courses include American Education and Public Policy; History of Education in the United States; Children, Civil Rights, and Public Policy in the U.S.; Introduction to the Study of International Comparative Education; History of Higher Education in the U.S.
2. Contemporary problem areas: courses include Urban Youth and their Institutions: Research and Practice; Theory and Issues in the Study of Bilingualism; Education and the Status of Women: Comparative Perspectives; Contemporary Social Issues in Child and Adolescent Development.
3. Foundational disciplines: courses include Social Sciences and Educational Analysis; Problems in Sociology of Education; Problems of Intelligence, Information, and Learning; Introduction to Philosophy of Education.

A directed reading course as well as directed research courses with a faculty member in Education are also required. Students in the program should enroll in the Undergraduate Honors Seminar, 199A,B,C during their senior year. Near the end of Spring Quarter, successful candidates for honors orally present brief reports of their work and findings at a mini-conference. All honors students in Education are expected to attend this conference.

COTERMINAL DEGREE PROGRAM

The School of Education admits a small number of students from undergraduate departments within the University into a coterminal A.B. and A.M. program. Not all of the four area committees offer coterminal degrees. Students in such a program receive the bachelor's degree in their undergraduate major and the master's degree in
Education. Approval of the student’s undergraduate department and of the School of Education is required. Undergraduates may apply when they complete 105 units, but no later than the end of the 11th quarter of undergraduate work. Students study for both the bachelor’s and master’s degrees simultaneously and must complete a total of 15 full-tuition quarters or three full-tuition quarters after completing 180 units toward the undergraduate degree. The number of units required for the A.M. degree depends on the program requirements within the School of Education; the minimum is 36 units.

Applicants may obtain coterminal degree application materials from the School of Education. Coterminal applicants may also consult with Graduate Admissions regarding eligibility.

**GRADUATE PROGRAMS**

Several advanced degree programs are offered by the School of Education and are described below. Requirements vary somewhat across programs. Both University and School of Education requirements must be met for each degree. The University requirements are detailed in the “Graduate Degrees” section of this bulletin. Students are urged to read this section carefully, noting residency, tuition, and registration requirements. A student who wishes to enroll for graduate work in the School of Education must be qualified and admitted to graduate standing by one of the area committees within the school.

Complete information about admissions procedures and requirements is available by writing Graduate Admissions, Registrar’s Office, Stanford University, Stanford, CA 94305-3005 or at http://www-leland.stanford.edu/dept/SUSE/. The admissions packet includes the publication *School of Education Guide to Graduate Programs*, which outlines degrees, programs, admission and graduation requirements, and research interests of the faculty; a reprint of the School of Education section of the *Stanford Bulletin*, which describes courses and degrees offered; and application materials. All applicants must submit scores from the Graduate Record Examination General Test (verbal, quantitative, and analytical areas); TOEFL scores are also required from those whose first language is not English.

**MASTER OF ARTS**

The A.M. degree is conferred by the University upon recommendation of the faculty of the School of Education and the University Committee on Graduate Studies. The University residency requirement is three full-tuition quarters of registration as a graduate student at Stanford. The minimum unit requirement is 36 quarter units earned at Stanford as a graduate student. At least 12 units must be taken for a grade point average (GPA) of ‘B’ or better, and a minimum of 18 units must be taken in the School of Education. Master’s students should obtain detailed program requirements from their area committees, and University degree requirements and forms from the Degree Programs office in the School of Education during their first quarter of residence. Some master’s degree programs require more than the minimum 36 quarter units. No thesis is required to earn a master’s degree; however some programs require a final project, paper, or monograph. Additional detailed information regarding entrance and degree requirements is available in the *School of Education Guide to Graduate Programs*. Upon admission, each student is assigned an advisor from the appropriate area committee to begin early planning of a coherent program.

The area committee programs with specializations available for Master of Arts degrees are as follows:

- Social Sciences, Policy, and Educational Practice (SSPEP)
- International Comparative Education (ICE)
- International Educational Administration and Policy Analysis
- Joint Program with Graduate School of Business
- Policy Analysis and Evaluation (APA)
- Prospective Principals Program
- Social Sciences in Education (Gender Studies)
- Social Sciences in Education (Interdisciplinary)
- Curriculum and Teacher Education (CTE)
- Curriculum Areas (Art, English, Social Studies Education, Science)
- General Curriculum Studies
- Teacher Education
- Language, Literacy, and Culture (LLC)
- Bilingual Education
- Language Policy
- Second Language Education
- Writing, Reading, and Language—English
- Learning Design and Technology (LDT)
- Stanford Teacher Education Program (STEP)

**PROSPECTIVE PRINCIPALS PROGRAM (PPP)**

The Prospective Principals Program at Stanford offers the A.M. degree with a specialization in Administration and Policy Analysis, which can be combined with the Preliminary Administrative Services Credential. It enables prospective principals to become leaders and to manage ideas, resources, and themselves to achieve worthwhile educational results for a diverse student population. This is accomplished through three consecutive summers of full-time study and is therefore available to persons working in a school system during the academic year. Teaching experience is a prerequisite for admission to this program. This master’s degree requires 45 quarter units. In or-
The School of Education offers opportunities for candidates to learn about and work with linguistically and ethnically diverse students. The program, which is optional, focuses on theories of language acquisition, English as a second language methodologies, and development of cross-cultural understanding and appreciation of multicultural diversity. Further information regarding admission requirements, course work, and credential requirements is available in the School of Education Guide to Graduate Programs.

STANFORD TEACHER EDUCATION PROGRAM (STEP)

STEP offers a Master of Arts program to prepare humanities and sciences college graduates for careers as secondary teachers of English, languages (French, German, Japanese, Mandarin, Spanish), mathematics, science (biological sciences, chemistry, physics,), and social studies. To be successful in classrooms with diverse student populations, STEP helps prospective teachers become more aware of their values, more flexible in their teaching and learning styles, and more knowledgeable in their subject matter. Prospective teachers must make educational choices based on an improved understanding of themselves, their students, their goals, and their educational context; STEP provides the cognitive tools for making those decisions.

The 12-month STEP year begins in June with a summer quarter of intensive academic preparation and experience in the Stanford Summer Teaching School. During the academic year, students take courses in professional education and academic subjects; they also teach part-time in middle or high schools for the entire public school year. The master's degree and Single Subject (secondary) Teaching Credential require 45 quarter units, taken during four quarters of continuous residency.

In accordance with California state regulations governing teacher education programs, STEP applicants must, by the January 2 application deadline: (1) pass the California Basic Educational Skills Test (CBEST), and (2) demonstrate subject matter competence. Candidates may demonstrate subject matter competence in one of two ways: (1) by passing all of the appropriate Praxis II and SSAT subject assessment tests, or (2) through completion of college or university courses in a California state-approved subject matter program. Applicants who completed their undergraduate studies at a university outside of California may be able to have their transcript evaluated by the Credentials Office at a California university with a state-approved subject matter program. Students may transfer up to 36 units of graduate course work taken within the past seven years.

Students should note carefully that admission to graduate standing by the University to work toward a doctoral degree does not in itself constitute admission to candidacy for the degree. Students must qualify and apply for candidacy by the end of their second year of study and should obtain information about procedures and requirements during their first year.

The two doctoral degrees offered in the School of Education differ in emphasis, purpose, and the intended careers of those who pursue them. They are equivalent with respect to the amount of time required and the rigor and quality of work demanded. In the Ph.D. degree program, there is greater emphasis on theory and research; the emphasis in the Ed.D. program is on informed and critical applications of existing knowledge to educational practice.

DOCTORAL DEGREES

Two types of doctoral degrees are offered by the School of Education. The Doctor of Philosophy (Ph.D.) degree is offered by all program area committees. The Doctor of Education (Ed.D.) degree is offered only in the concentrations of Policy Analysis and Higher Education Administration within the area of SSPEP. Both degrees are conferred by the University upon recommendation by the faculty of the School of Education and the University Committee on Graduate Studies. University residency requirements (nine full-semester quarters or the equivalent), amount of transfer credit applicable (no more than three full quarters), and the timetable for the stages of progress are the same for both degrees. Additionally, the School of Education unit requirement for both degrees is a minimum of 72 units of course work and research completed at Stanford beyond the baccalaureate degree. 

Students should note carefully that admission to graduate standing by the University to work toward a doctoral degree does not in itself constitute admission to candidacy for the degree. Students must qualify and apply for candidacy by the end of their second year of study and should obtain information about procedures and requirements during their first year.

The two doctoral degrees offered in the School of Education differ in emphasis, purpose, and the intended careers of those who pursue them. They are equivalent with respect to the amount of time required and the rigor and quality of work demanded. In the Ph.D. degree program, there is greater emphasis on theory and research; the emphasis in the Ed.D. program is on informed and critical applications of existing knowledge to educational practice.
The Ph.D. degree is designed for students who are preparing for (1) research work in public school systems or specialized institutions; (2) teaching roles in education in colleges or universities, and research connected with such teaching; or (3) other careers in educational scholarship and research.

The Ed.D. degree is a professional educational degree intended to meet the needs of (1) those who wish a thorough and comprehensive professional understanding of and competence in dealing with educational problems met by administrators, supervisors, and curriculum specialists; and (2) those who wish a scholarly preparation for teaching education in colleges or universities.

Ph.D. students must complete a minor in another discipline taught outside the school, or hold an acceptable master's degree outside the field of education, or complete an approved distributed minor that combines relevant advanced work taken in several disciplines. A minor is not required for the Ed.D.

Upon admission, an adviser assigned from the admitting area committee works with the student to establish an appropriate and individualized course of study, a relevant minor, and project research plans. Other faculty members may also be consulted in this process. Details about the varying administrative and academic requirements for each area committee and the School of Education, along with general time frame expectations, are given in the School of Education Guide to Graduate Programs. Complete guidelines may be obtained from the specific area committees.

COURSES
OTHER DIVISIONS OF THE UNIVERSITY

Teachers, administrators, researchers, and specialists in other areas of education are expected to have substantial knowledge of a variety of academic fields outside the areas encompassed by professional education. Graduate students in the School of Education are therefore urged to consider the courses offered in other divisions of the University in planning their programs.

EDUCATION

The numbering of courses in the School of Education identifies approximately the course level and the audience to which a given course is offered:

100-level—Primarily for undergraduates (graduates may enroll)
200- and 300-level—For A.M. and first- and second-year doctoral students
400-level—Research seminars or similar courses primarily for third-year doctoral students and beyond

Course descriptions are in numerical order and indexed by professional program areas.

An "X" suffix denotes a new experimental course. With faculty approval, after being taught twice, it can be offered as a regular course in the School of Education.

An "S" suffix denotes a special course, given only once and usually taught by visiting faculty.

95S. Issues in Leadership—Priority given to undergraduates and master's degree students. Basic theories and concepts in leadership and group process. Topics: identification of core values, building shared vision, group problem solving, leadership
styles, decision-making, power and influence, conflict management, ethical dilemmas, community building, and personal policy development. Interactive and experiential, and for students currently in leadership positions in the University or who have jobs or volunteer roles where they are working in groups. Enrollment limited to 24. (SSPEP)

3-4 units, Win (Porteous)

100C. Issues and Methodologies in Education: An Introduction for Elementary and Secondary Tutors in Culturally Diverse Settings—Introduces theoretical and methodological issues in and approaches to education. Readings, assignments, and in-class exercises prepare students for tutoring socioeconomically and ethnically diverse populations in a variety of subjects. Required concurrent tutoring placements. (SSPEP)

3 units (Wolfe) not given 1997-98

100X. The State of Public Education in Urban Communities—Introduction to the current issues and problems in public education in urban communities and the efforts to revitalize schools and communities. Guest presentations by faculty and community members. Community service placement as a tutor or classroom aide required. (SSPEP)

3 units, Win (Takemoto)

102. Culture, Class, and Educational Opportunity—Upward Bound and EPASSA counselors work with students from educationally disadvantaged backgrounds. Topics: language education, culture and family, class management, school finance, and community-school relations. Mandatory school visits and classroom observations. (LLC)

4 units, Spr (Staff)

105. American Education and Public Policy—(Same as History 158B.) Treats policy issues in education, drawing on history and political science. Who influences schooling and how? How have American schools responded to human diversity? What consequences does schooling have? What are the prospects for reform in public education? Lectures and small group discussions. (SSPEP/APA)

4 units, Aut (Kirst, Tyack)

106. Interactive Media in Education—Introduction to the use of interactive media in formal education. Workshop views/uses commercial interactive media for education and analyzes/criticizes them. Ideas are used to interpret/understand the experience of learning with interactive media. (CTE)

3-5 units, Sum (Walker, Kerns)

108X. Ethnogerontology: Aging and Ethnicity—(Same as Human Biology 105.) Key sociocultural issues of the aging process; issues involved in assessment and treatment of mental and physical health problems of identified ethnic groups. Guest lectures by Asian American, Hispanic American, and African American experts in ethnogerontology.

Supervised fieldwork with elders of various cultural and ethnic backgrounds. (PSE)

3 units (Wolfe) not given 1997-98

111. Introduction to Philosophy of Social Science—(Same as Philosophy 61.) For upper-division undergraduates majoring in social sciences, and for beginning graduate students in related areas such as education. Focuses on the difference writers have noted between the natural and social sciences, and on attacks on the ideal of a "naturalistic" social science. Topics: explaining human action, the functional explanation of social phenomena, and holistic vs. reductionist orientations. Examples for contemporary social science (and especially educational) research literature. (SSPEP)

3 units (Phillips) not given 1997-98

120. Symbolic Systems Seminar: Problems in Intelligence, Information, and Learning—(Same as Symbolic Systems 200.) Interdisciplinary topics in cognitive science, (e.g., modularity, representation, reasoning, situated action, or creativity.) Prerequisites: Computer Science 109, Linguistics 120 or 130, Philosophy 80, Psychology 40.

3 units, Win (Greeno, Wasow)

130. Introduction to Counseling—Theories and techniques of counseling. Emphasizes clients' individual and cultural differences and construction of one's own theory of the counseling process and outcome. Two psychotherapeutic theories, cognitive-behavioral and existential-humanistic, are supplemented with a third theory of each student's choice. Experiential, problem-based course focuses on how to develop self-awareness and conceptual understandings of counseling process in culturally diverse contexts. (PSE)

3 units, Win (Staff)

136. World, Societal, and Educational Change: Comparative Perspectives—(Same as 306D.) Analysis of the relations between educational and societal developments from a comparative perspective. Readings on various theoretical perspectives and empirical studies on the structural and cultural sources of educational expansion and differentiation, and on the cultural and structural consequences of educational institutionalization. Research topics: education and nation-building; education, mobility, and equality; education, international organizations, and world culture. (SSPEP/ICE)

5 units, Aut (Ramirez)

141. Children, Civil Rights, and Public Policy in the U.S.—(Same as 241.) Overview of the critical issues and policies that impact children and civil rights in our society. Lectures, readings, and discussions on challenges facing America in the 1990s. National policy and legal concerns pertaining to children and civil rights in a historical and practical
perspective. The people and institutions that play central roles in the policy making and judicial process. (SSPEP/APA)

5 units (Staff) given 1998-99

145S. The History of American Literacy Instruction: The Reading Wars—For sophomores only. Our expertise with language: seminar on the complexities of this skill, reviewing the invention of print and the peculiarities of English, spoken and written. The Cubberley collection of 19th-century readers, "Dick and Jane" basals from the 1940s, phonics series from the 1960s, and children's literature from contemporary Whole Language programs, "Why Johnny can't read." Participants in that great debate (teachers, policy makers, and students). Student project connects past events with current practice. (LLC)

4 units (Calfee) not given 1997-98

149. Theory and Issues in the Study of Bilingualism—(Same as 249, Spanish 207.) Key issues in the study of bilingualism from a sociolinguistic perspective. Emphasis is on typologies of bilingualism, the acquisition of bilingual ability, the description and measurement of bilingualism, and the nature of societal bilingualism. Prepares students to work with bilingual students and their families and to carry out research in bilingual settings. (LLC)

4 units, Aut (Valdés)

151X. Theory and Practice in Service-Learning Pedagogy—The history, theoretical foundations, and practical applications of service learning pedagogy in K-12 and post-secondary curriculum and instruction. The design, development, implementation, and assessment of instructional methods which facilitate integrating service experience with the learning of academic subject matter. Two-hour weekly seminar and school and community-based observation and analysis. (STEP)

2-3 units, Spr (Hill, Addison-Jacobson, Stanton)

155. Development of Measuring Instruments—For students planning to develop written or performance tests or questionnaires for research and evaluation, and for teachers wishing to improve classroom examinations. Planning tests, writing items, item tryout and criticism, qualities desired in tests, and interview techniques. Lectures, case studies, and practical exercises. (PSE)

3 units, not given 1997-98

160X. Introduction to Statistical Methods in Education—Master's students enroll in 266X; doctoral students in LLC enroll in 216. Introduction to quantitative methods in educational research for doctoral students with little or no prior statistics. Organization of data, descriptive statistics, elementary methods of inference, hypothesis testing, and confidence intervals. Computer package used. Students cannot also receive credit for Psychology 60, or for Statistics 60 or 160. (All Areas)

4 units, Aut (Haertel)

161. Introduction to Teaching and Learning in Asia—Preparation for transcultural living and teaching experiences. Emphasis is on knowledge of Asian history and culture; skills required for living in an Asian community; and the role played by American culture in shaping one's own attitudes, values, and behavior. Prerequisite: consent of instructor. (SSPEP/ICE)

3 units (Herring) not given 1997-98

170. Gender and Education—The impact of organizational and larger societal forces on the experience of men and women in educational institutions. Effects on educational outcomes and on the way boys and girls relate to each other in educational settings. The evidence for bias against girls within schools, focusing on making arguments and forming policies based on research evidence. (SSPEP)

4 units, Spr (Christopher)

171X. Peer Health Education—Preference given to students who make a commitment to serving as a Peer Health Educator. Instruction in peer health education leading to a Stanford University Peer Health Education certificate. Topics: health promotion program planning, theory and practice of behavior change, and an exploration of contemporary college health issues. Seminars and problem-based learning. Enrollment limited. Prerequisite: consent of instructor. (PSE)

3 units, Spr (Thoresen)

173X. Peace Studies—(Same as History 154, Political Science 133, Psychology 165.) Interdisciplinary, dealing with the challenges of pursuing peace in a world where the sources of conflict are many and regional/ethnic/religious antagonisms are rising. The art of creating and maintaining peace is analyzed from historical, social, psychological, and moral perspectives. Goals: illustrate the current and potential contributions of various academic disciplines and critical analyses to the study of peace, and to prepare students to think critically and to act responsibly and effectively on behalf of peace. Eight sections: challenges, enemies, theoretical understandings, justice, security, non-violence, public peace processes, peace and you. GER:3b (DR:9) (All Areas)

5 units, Spr (Bernstein, Bland, Noddings, Ross)

177X. Education of Immigrants in Cities—(Same as 277X.) Historical and contemporary approaches to educating immigrant students. Case study approach focuses on urban centers to demonstrate how stressed urban educational agencies serve immigrants and native-born U.S. students when confronted with overcrowded classrooms, controversy over curriculum, current school reform movements...
and government policies regarding equal educational opportunity. (LLC)

4 units, Win (Padilla)

179X. Urban Youth and their Institutions: Research and Practice—(Same as 279X.) Determinants and consequences of urban life for youth, emphasizing disciplinary and methodological approaches to the study of policies and practices and the growing gap between the perspectives of state and local organizations and those of youth and their communities. The diversity of urban youth experiences with respect to ethnicity, gender, and immigration histories: case studies illustrate civic-level and grassroots institutions, their structures, networks, and philosophies; historical and contemporary examination of diverse realities of urban youth for policymakers, educators, and researchers. Focuses on U.S. cities, with comparative materials from international research. Macro and case-study approaches. Enrollment limited. Prerequisite: consent of instructor. (SSPEP/APA)

3 units, not given 1997-98

180. Directed Reading in Education—For undergraduates and master’s degree students. (All Areas)

1-15 units, any quarter (Staff)

181X. Mind, Body, and Spirit: Spiritual Health through the Life Span—(Same as 281X.) The spiritual components of daily living and optimal health are commonly neglected in prevailing educational, medical, and psychological paradigms. Introduction to spiritual features of everyday life, primarily from a psychosocial perspective with a focus on health and well being. Readings and problem-based learning tasks in solving spiritually-related problems. Introduction to elementary spiritual practices. Topics applicable in one’s personal and professional life. Limited enrollment. Prerequisite: consent of instructor. (PSE)

3 units, not given 1997-98

190. Directed Research in Education—For undergraduates and master’s degree students. (All Areas)

1-15 units, any quarter (Staff)

193A. Peer Counseling: Bridge Community—Instruction in peer counseling. Topics: verbal and non-verbal skills, the use of open and closed questions, working with feelings, summarization and integration. Counseling issues that may be salient when working with Chicanos, including the significance and process of Spanish-English code switching in communication, the role of ethnic identity in self-understanding, the relationship of culture to personal development, and the experience of Chicano students in university settings. Lectures, individual training, group exercises, discussion, role play, and videotape practice. (PSE)

2 units, Aut, Spr (Martinez)

193C. Peer Counseling: The African-American Community—Instruction in peer counseling with Blacks. Topics: the concept of culture, Black cultural attributes and their effect on Blacks’ reactions to accepting counseling, verbal and non-verbal attending, the use of open and closed questions, working with feelings, summarization, and integration. Geared toward counseling with Blacks; methods of instruction include reading assignments, lectures, guest speakers, group discussion, role play, and videotaped practice. Students develop and apply skills in the Black community on campus or in other settings that the student may choose. (PSE)

2 units, Aut (Edwards, Reed-Hoskins)

193F. Peer Counseling: The Asian American Community—Topics: the Asian family structure, concepts of identity, ethnicity, culture, and racism in terms of their impact on individual development and the counseling process. Emphasizes the development of an appreciation and empathic understanding of Asians in America. Lectures, readings, discussion, and group exercises. (PSE)

2 units, Aut (Wang)

193N. Peer Counseling in the Native American Community—Instruction in basic counseling techniques. Topics: verbal and non-verbal communication, strategic use of questions, methods of dealing with strong feelings, and conflict resolution. Emphasizes how basic elements of counseling apply to Native Americans, including client, counselor, and situational variables in counseling, the significance of non-verbal communication, the role of ethnic identity in self-understanding, the relationship of culture to personal development, the impact of family on personal development, gender roles and Native Americans, and the experience of Native American Indian students in university settings. Lectures, individual skill development, group exercises, and role practice. (PSE)

2 units, Spr (Staff)

197. Education and the Status of Women: Comparative Perspective—Theories and perspectives from the social sciences relevant to an understanding of the role of education in changing, modifying, or reproducing structures of gender differentiation and hierarchy. Cross-national research on the status
of women and its uses to evaluate knowledge claims from varying perspectives. (SSPEP) GER: 4c (DR: †)
4-5 units, Win (Ramirez)

199A, B, C. Undergraduate Honors Seminar—Required for all juniors and seniors in the honors program in the School of Education. Supports students' actual involvement and apprenticeships in educational research. Participants are expected to share ongoing work on their honors thesis. Prerequisite: consent of instructor. (All Areas)
1 unit, Aut, Win, Spr (Staff)

200X. The Work of Art and the Creation of Mind—Collaboration between the Art, Dance, Drama, and Music programs, and the School of Education examines the relationship between the work of art and the creation of mind, i.e., the work of art as a task of making something and as a form that has been made. The ways a conception of art develops and refines the mind. Discussion, readings, and observation of artists at work. The relationship between forms of art and forms of thought. What does either the perception or creation of art in any of its forms do to how we think and know? (CTE)
4 units, Win (Eisner, Hannah, Rehm, Ross, Sano)

201. History of Education in the United States—(Same as History 158.) Analysis of selected turning points in education in relation to religion, political socialization, race relations, gender, immigration, and urbanization. (SSPEP)
3 units, Aut (Tyack)

202X. Introduction to Comparative and International Education—Introduction to the field of comparative and international education. Contemporary theoretical debates about educational change and development, and the international dimension of several contemporary issues in education. Emphasis is on the development of students' abilities to make cross-national and historical comparisons of educational phenomena. (SSPEP/ICE)
4-5 units, Aut (Mundy, Carnoy, Ramirez)

204. Introduction to Philosophy of Education—Introduces current approaches and techniques in the philosophy of education; material has been selected for its general relevance to students of education. Feminist and radical theories of education. Introductory philosophical material is presented in the context of educational issues. (SSPEP)
4 units, Aut (Phillips)

206A. Applied Research Methods in International and Comparative Education I: Introduction—Required for all A.M. students in ICE and IEAPA, others by consent of instructor. Orientation to the A.M. program and research project, exploration of resources for study and research. (SSPEP/ICE)
1-2 units, Aut (Chabbott)

206B. Applied Research Methods in International and Comparative Education II—Required for all A.M. students in ICE and IEAPA; others by consent of instructor. Development of research skills through discussion of theoretical and methodological issues in comparative and international education. Preparation of a research proposal for the A.M. monograph. (SSPEP/ICE)
3-5 units, Win (Chabbott)

206C. Applied Research Methods in International and Comparative Education III: Master's Monograph Workshop—The conclusion of the four-quarter A.M. program in ICE and IEAPA, required of all A.M. students. Provides in-depth reviews of students' research in preparation for the completion of their Master's Monograph. (SSPEP/ICE)
2-5 units, Sum (Chabbott)

207. Seminar: The Politics of International Cooperation in Education—Analysis of policies and practices in international cooperation, assistance, and exchange. Emphasis is on the role of international organizations (World Bank, UNESCO, OECD) and the politics of multilateral and bilateral assistance programs. (SSPEP/ICE, APA)
3-4 units, Win (Mundy)

208B. Introduction to Curriculum—The practice of curriculum improvement including planning, policy making, development, implementation, and evaluation. Extensive, in-depth treatment of methods and approaches to curriculum improvement and their strengths and limitations. (CTE)
3 units, Spr (Boston)

208C. Introduction to Curriculum—Restricted to students enrolled in the Prospective Principals Program. Curriculum studies for those concerned primarily with school administration. Topics: curriculum theory, relation of theory and practice, schools and classrooms as contexts for curriculum, curricular policy mandates, leadership in school curricular issues, curriculum development, curriculum implementation. (CTE)
3 units, Sum (Staff)

209X. Communities of Learning: Recasting Relationships in the Classroom and School—Investigates theory, policy, and practice of efforts to build community in schools. Discussion of varied conceptual frameworks for alternative education and school organization from Dewey, Gardner, Sergiovanni, and Goodlad. Enrollment limited; fee. (CTE)
4 units (Shulman) not given 1997-98

210. Problems in Sociology of Education—(Meets with 310; same as Sociology 232/330.) Introduction to sociological approaches to educational phenomena. Topics: school organization and environment, the relationship of education to adult roles, the impact of social class and ethnicity on classroom
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learning, and the social structure of the classroom. Read/evaluate social sciences research. Short written assignments and individual feedback. (SSPEP)
4 units, Win (Cohen)

211X. Master's Seminar in Social Sciences in Education—Limited to master's students in SSE. Directed, hands-on forum for SSE students to critically examine the process of developing and shaping a research program, integrating it with academic and field experiences, and building relationships beyond the program. Students conceptualize their projects and focus on researchable topics: effective revising and editing, job searches, working with your adviser, "what next?" or a celebration of our achievements so far. (SSPEP)
1 unit, Aut, Win, Spr (Christopher)

212. Groupwork for Heterogeneous Classrooms—Theory and practice of cooperative learning: organizing and managing the classroom for groupwork, designing multiple ability curricula and treating status problems in classes where students have a wide range of previous academic achievement. Small group discussions of teacher-authored cases about the dilemmas of groupwork, analyze videotapes, and experience skill-builders for successful groupwork. Final project of writing, teaching, and evaluating a multiple ability group activity. (STEP)
1-3 units, Aut (Lotan)

213. Aesthetic Foundations of Education—What role might the arts play in education? Do the arts contribute to the development of cognitive skills? Do they help humans understand the world in which they live? Are aesthetic considerations central in the way we think about the aims of education? Do they enhance teaching and school organization? (CTE)
4 units (Eisner) given 1998-99

214X. Popper, Kuhn, and Lakatos—(Same as Philosophy 156.) Popper, Kuhn, and Lakatos are 20th-century philosophers of science who have raised fundamental issues dealing with the nature of scientific progress: the rationality of change of scientific belief, science vs. non-science, role of induction in science, truth, or verisimilitude as regulative ideals. Their impact in the social sciences and applied areas such as educational research. (SSPEP)
3 units (Phillips) not given 1997-98

215. American Education and Public Policy—(Same as History 158B.) For graduate students. See 105. (SSPEP/APA)
3 units, Aut (Kirst, Tyack)

216A,B. Survey of Educational Research Methods—For first-year LLC doctoral students and others. The basics of conceptualization, design, instrumentation, and interpretation of empirical research using quantitative and qualitative approaches. Designed around individual student projects. (LLC, CTE)
216A. 5 units, Aut (Calfee)
216B. 5 units, Win (Calfee)

217. Intellectual Development and Instructional Design—Research on children's thinking and its development has been conducted within distinct traditions, each with its own focus, methodology, and background assumptions, i.e., the empiricist tradition (from Gesell to Siegler), the rationalist tradition (from Baldwin and Piaget to Case and Carey), and the sociohistoric tradition (from Vygotsky to Cole and Olson). Introduction to these traditions, emphasizing their implications for instruction. Empirically-based paper required. (PSE)
4 units (Case) not given 1997-98

218. Society, Education, and Dance—(Enroll in Drama 240.) (CTE)
4-5 units, Aut (Cashon, Ross)

219. Artistic Development of the Child—How can children's and adolescents' development in the arts be described? What roles does the symbolic transformation of experience play in the creation of those images we regard as art? What can teachers do to promote the development of artistic thinking? These and other questions are examined through the study of theory and research conducted within the social sciences. (CTE)
4 units, Aut (Eisner)

220A,B,C,D,Y. The Social Sciences and Educational Analysis—Required of students in APA and open to all. Economics, political science, sociology, and history, and their applications to education in the U.S.

220A. The Social Sciences and Educational Analysis: Introduction to the Economics of Education—Overview of the relationship between education and economic analysis. Topics: investment and consumption theories of education, the effects of education on earnings and employment, the effects of education on economic growth and distribution of income, and the financing of education. Students who lack training in micro-economics enroll in 220Y for one additional unit of credit. (SSPEP/APA)
4 units, Win (Strober)

220B. Introduction to the Politics of Education—The relationships between political analysis and policy formulation in education; focus is on alternative models of the political process, the nature of interest groups, political strategies, community power, the external environment of organizations, and the implementations of policy. Applications to policy analysis, implementation, and politics of reform emphasized. Prerequisite: Political Science or Public Policy major, or student in SSPEP. (SSPEP/APA)
4 units, Win (Kirst)
220C. Education and Society—(Same as Sociology 130.) Effects of schools and schooling on individuals, the stratification system, and society. Education as socializing individuals and as legitimizing social institutions. Social and individual factors affecting the expansion of schooling, individual educational attainment, and the organizational structure of schooling. (SSPEP/APA)

5 units, Spr (Meyer)

220D. History of School Reform: Origins, Policies, Outcomes, and Explanations—(Same as History 301E.) Restricted to undergraduates working on honors theses in education and graduate students. School reform as an interaction between the broad context (social, economic, political, and ideological factors), schools as institutions, and the goals and behaviors of groups and individuals. Why and how some school reforms persist, why some fail or fade, and why some recur periodically. Focuses on early 1900s, 1950s and '60s, and current state-driven changes. Students investigate a particular reform: its sources, policy development and implementation, and the consequences, intended and unintended, using one or more of the analytic frameworks presented. Enrollment limited to 30. (SSPEP/APA)

4 units (Cuban, Tyack) not given 1997-98

220Y. Introduction to the Economics of Education: Economics Section—Introduction to micro-economics for those taking 220A who have not had micro-economics before or who need a refresher. Corequisite: 220A. (SSPEP/APA)

1 unit, Win (Staff)

221. Issues in Policy Analysis—Major concepts associated with the development, enactment, and execution of social policy. Issues of policy implementation, agenda setting and problem formulation, coalition politics, and intergovernmental relations are examined through case materials and supplementary readings. Objective: identify and understand factors that affect ways in which analysts and policymakers learn about the policy system and ways in which they can influence it. Enrollment limited, consent of instructor required. (SSPEP/APA)

5 units, Spr (Kirst)

222. Resource Allocation in Education—Problems of optimization and design, and evaluation of decision experience. Marginal analysis, educational production functions, cost effectiveness and cost-benefit analysis, constrained maximization, program evaluation. Introduction to linear models for large-scale data analysis. Implications to model assumptions. (SSPEP/APA)

4-5 units, Spr (Staff)

223. Good Schools and How They get Made: Research, Policy, and Practice—Recent studies of schools that exceed expectations in producing desired results. Research methodologies, findings of studies, and efforts to implement results. Components of "good" schools analyzed: effective teaching, principal leadership, organizational processes, parent involvement, cultures in schools, role of superintendent. Required project studies a school and determines "goodness." (SSPEP/APA; CTE)

3-4 units, Sum (Cuban)

224. Information Technology in the Classroom—Use of information technology (computers, interactive video, telecommunications) in secondary school classroom teaching. Basic computer operations and terminology; challenges of planning and teaching with technology; judging the merits of products for educational uses; survey of the types of uses made of technology in schools; and economic, social, and ethical issues, emphasizing equity. Meets fifth-year teacher credential requirement. Winter Quarter open to STEP teachers preferentially. (CTE, STEP)

3-4 units (Staff) not given 1997-98

225. Higher Education Economics, Finance, and Management—Required of Higher Education master's students; recommended for Higher Education doctoral students. Survey of higher education economics, finance, and management. Topics: the general economic model for non-profit entities, revenue sources and uses, cost structures, capital sources and uses, financial reporting, resource allocation methods, information technology, and academic and administrative productivity. Issues such as affordability, cost containment, quality assessment, the teaching-research tradeoff, and approaches to institutional restructuring. Prerequisite: 346. (SSPEP/APA)

4 units, Win (Staff)

226. Classroom Assessment—Research on classroom testing; creating and selecting classroom tests; instructional uses of tests, performance tests, classroom observations, linking testing and instruction, using standardized test results. (PSE)

3 units, Spr (Haertel)

227. Individual Counseling Psychology Methods—(Same as Psychology 250.) Techniques for helping individual clients learn successful procedures for coping with problems, e.g., shyness, depression, anxiety, obesity, and aggression. (PSE)

3 units (Staff) not given 1997-98

228. Research on Reading and Reading Acquisition—For doctoral and master's students in LLC, PSE, CTE, and SSPEP. Focuses on application of psychological principles in understanding the reading and writing process and the acquisition of literacy in school and non-school settings. Key concepts: psycholinguistics, perception and cognition, motivation, and individual differences. (LLC)

3-4 units (Calfee) not given 1997-98
229A,B,C,D. Seminar in Learning Design and Technology—Four-quarter seminar core of the LDT master’s program. Focus: learning, cognition, and development; design principles for technological learning environments; technological literacy and skills; research methods and evaluation; curriculum and content; organization structure and operation. Students navigate one or more design sequences in learning environments rooted in a practical problem. Topics in learning, design, and technology are examined from a theoretical and a practical application perspective through readings and hands-on development as a team-collaborative effort. (All Areas)

229A. 3 units, Sum (Staff)
229B. 3 units, Aut (Barron, Greeno)
229C. 3 units, Win (Kamil)
229D. 3 units, Spr (Walker)

230X. Ethnographic and Empowerment Approaches to Evaluation, Policy Decision Making, and Organizational Transformation—The role of ethnography in addressing contemporary and socially significant issues. The value of ethnographic evaluation in educational settings plus successful strategies to effectively communicate qualitative findings with powerful policymaking bodies to improve our world, including testifying on the hill and sharing findings through the media. Role of ethnographic and empowerment evaluation in contributing to organizational transformation. (SSPEP)

5 units, Spr (Fetterman)

232A. Teaching and Teacher Education—First of three core courses in CTE. Theory and practice of teaching, past and present (k-12 and higher education). (CTE)

4 units, Win (Atkin, Cuban)

232B. Introduction to Curriculum—Second of CTE core. What should American schools teach? How should school programs be organized? How can schools determine whether the goals they have formulated have been achieved? What kind of school organization helps teachers improve their teaching practices? Students secure a historical and contemporary perspective on the curriculum of American schools. The interactions among curriculum, the organizational structure of schools, the conception of the teacher’s role, and the way in which teaching and student learning are assessed. Text, video analysis of teaching, and small group discussions examine competing ideas regarding the content and aims of school programs. (CTE)

4 units, Aut (Eisner, Atkin, Boston)

232C. Evaluation of Curriculum and Teaching Innovations—Third of CTE core. Focuses on evaluation of innovations in curriculum and teaching in U.S. classrooms and schools. Evaluations of innovations in other settings where formal instruction takes place, (e.g., colleges or museums). Readings on theoretical and practical issues faced in planning and conducting evaluations (e.g., qualitative and quantitative studies, formative and summative evaluation, access, ethics). Ideas about evaluation compared to the practice of evaluation as reflected in accounts of classic curriculum evaluations. Major project designs an evaluation of an actual curriculum or teaching innovation and tries out critical elements of the design. (CTE)

3 units, Spr (Walker, Ben-Peretz)

233A. Counseling Theories and Interventions from a Multicultural Perspective—Review of foundational and new concepts of counseling theory and intervention from a multicultural perspective. Provides students an opportunity to review the impact of culture on clinical presentation, relationship formation, and intervention development and evaluation in individual and group counseling. (PSE)

3 units (LaFramboise) not given 1997-98

233B. Counseling Theories and Interventions from a Multicultural Perspective, Part B—Alternative roles for multicultural counselors building on the foundational skills of individual and group counseling in 233A. Adviser, advocate, facilitator of indigenous support systems, facilitator of indigenous healing systems, consultant, change agent, and counselor roles and functions in light of the client’s level of acculturation, locus of problem etiology, and goals of helping.

3 units (LaFramboise) not given 1997-98

234. Career and Personal Counseling in Culturally Diverse Settings—(Same as Psychology 237.) Methods of integrating career and personal counseling with clients and counselors from differing backgrounds. Practice with selected assessment instruments. Case studies of bicultural role conflict. Informal supervised experience. (PSE)

3 units (Krumholz) given 1998-99

235X. Graduate Proseminar in Educational Policy—Enrollment limited to master’s students in Administration and Policy Analysis. (SSPEP/APA)

1 unit, Aut, Win, Spr (Fetterman)

236X. Quantitative Methods in Language Research—General notions of level of measurement, norms, standardized scores; different types of reliability, validity, and item analyses as applied to the construction of student designed measures in the language and behavior area, including language functions, attitudes, and beliefs. (LLC)

4 units (Fishman) not given 1997-98

237. Psychological Assessment—(Same as Psychology 229.) Administration and interpretation of commonly used measures of interest, aptitude, achievement, intelligence, and personality for purposes of individual diagnosis and treatment. (PSE)

1-3 units, not given 1997-98

238A. Orientation to Counseling Psychology—For first-year counseling psychology students. Overview of counseling psychology profession includ-
ing counseling theories, techniques, and assessment. Topics: relationship enhancement, problem conceptualization, goal setting, intervention techniques, and monitoring outcomes. Review of training tapes, role-playing, and supervision of initial counseling experiences. Prerequisite: consent of instructor. (PSE)

3 units, Aut (LaFromboise, Thoresen)

238B. Counseling and Health Psychology: Supervised Applications—For first-year counseling psychology students. Integration of counseling practice with research findings. Continuing review of training tapes, role-playing, and supervision of counseling experiences. Prerequisite: consent of instructor. (PSE)

3 units, Win (Krubitz, LaFromboise, Thoresen)

238C. Counseling and Health Psychology: Supervised Applications—For first-year counseling psychology students. Advanced study of counseling theories, techniques, and assessment methods. Emphasis on the integration of counseling practice within a research framework. Continuing review of training tapes, role-playing, and supervision of counseling experiences. Prerequisite: consent of instructor. (PSE)

3 units, Spr (Krubitz LaFromboise, Thoresen)

239. Contemporary Social Issues in Child and Adolescent Development—Focuses on critical social and developmental issues that affect children and adolescents. Topics: divorce and single parenting, child care, poverty, sexuality, and mass media, emphasizing the impact of these conditions on normal development, education, and school-related social and cognitive performance. (PSE)

4 units (Padilla) not given 1997-98

240. Adolescent Development and Learning—Two presuppositions: that fruitful instruction takes into account the developmental characteristics of learners and the task demands and structure of specific curricula; and that teachers can promote learning and motivation by mediating between the characteristics of students and the characteristics of the curriculum and the wider social context of the classroom. The strategies and issues involved in this mediational process with secondary students. Prerequisite: STEP student or consent of instructor. (STEP)

1-2 units, Aut (Phillips, Roeser)

241. Children, Civil Rights, and Public Policy in the U.S.—For graduate students. See 141.

5 units (Steyer) given 1998-99

242. First-Year Proseminar in Language, Literacy, and Culture—For master's and first-year doctoral students in LLC. Introduces basic concepts and pragmatics of the field; provides opportunities to meet faculty, respond to critical readings, and explore professional matters. (LLC)

4 units, Aut, Win, Spr (Baugh, Hakuta, Kamil, Valdés)

243. Research in Writing and Writing Instruction—Tradition and change in writing research, emphasizing theoretical and pedagogical implications. Topics: Formalist, cognitive, and social-contextual approaches; writing and reading connections; writing/speaking connections; the composing process; writing pedagogy; individual research projects. (LLC, CTE)

4 units (Sperling) not given 1997-98

246A, B, C, D. Secondary Teaching Seminar—Preparation and practice in issues and strategies for teaching in classrooms with diverse students. Topics: instruction, curricular planning, classroom interaction processes, portfolio development, teacher professionalism, patterns of school organization, teaching contexts, and government educational policy. Classroom observation and student teaching with accompanying seminars during each quarter of STEP year. 16 units required for completion of the program. Prerequisite: STEP student. (STEP)

246A. 1-13 units, Sum (Carter)

246B. 1-13 units, Aut (Carter)

246C. 1-13 units, Win (Carter)

246D. 1-13 units, Spr (Carter)

247. Moral Education—Issues in moral theory and education, including considerations of the Kohlberg-Gilligan debate, character education, and contemporary issues on values and religious education. (SSPEP)

4 units, Win (Greer)

248. Theory and Issues in Literacy—Theoretical issues in writing and literacy and implications for education. Connections between literacy, thinking, and learning, emphasizing kinds and definitions of literacy, oral and written language, social construction of literacy, historical perspectives, and the functions of reading and writing. (LLC)

4 units, Aut (Sperling)

249. Theory and Issues in the Study of Bilingualism—For graduate students; see 149. (LLC)

3 units, Aut (Valdés)

250A. Statistical Analysis in Educational Research—Primarily for doctoral students. Regression and categorical models are widely used data-analytic procedures. Topics: basic regression including multiple and curvilinear regression, regression diagnostics, analysis of residuals and model selection, logistic regression, analysis of categorical data. Proficiency with statistical computer packages. Prerequisite: 160X or equivalent. (All Areas)

4 units, Aut, Win (Staff)

250B. Statistical Analysis in Educational Research: Analysis of Variance—Sequence, primarily for doctoral students. Analysis of variance mod-
els are among the most widely used data analytic procedures, especially in experimental, quasi-experimental, and criterion-group designs. Topics: single-factor ANOVA, factorial between and within-subjects and mixed design ANOVA (fixed, random, and mixed models), analysis of covariance, multiple comparison procedures. Prerequisite: 160X or equivalent. (All Areas)

4 units, Spr (Shavelson)


4 units, Aut (Okin)

251X. Language and Ethnicity—Why language is frequently a component of ethnonational consciousness and what attributes are ascribed to language when it becomes consciously associated with ethnic groups and movements. Cases from various parts of the world; general theories of language and ethnicity analyzed. (LLC)

4 units, Win (Fishman)

252. Introduction to Test Theory—Concepts of reliability and validity; derivation and use of test scales and norms; mathematical models and procedures for test validation, scoring, and interpretation. Prerequisite: Statistics 190 or equivalent. (PSE)

3-4 units, Spr (Shavelson)

255. Human Abilities—(Same as Psychology 133.) Introductory survey of psychological theory and research on human cognitive abilities; their nature, development, and measurement, and their importance in society. Relation of education and intellectual abilities. Cognitive analysis of verbal reasoning and spatial abilities. Individual differences in relation to motivation, personality, gender, and ethnic differences. Prerequisite: Psychology 1 or equivalent. (PSE)

3 units, Win (Haertel)

255A. Human Abilities Research Topics—Discussion of individual student research topics in human abilities. Planned as an adjunct to 255 and Psychology 133 for doctoral students who have special interests not served by the large group instruction provided in those courses. Corequisites: 255 or Psychology 133, and consent of instructor. (PSE)

1-2 units, Win (Snow)

257A. B. Statistical Methods for Behavioral and Social Sciences—For second-year doctoral students with experience and training in empirical research. Analysis of data from experimental studies through factorial designs, randomized blocks, repeated measures; regression methods through multiple regression, model building, analysis of covariance; categorical data analysis through two-way tables, logistic regression. Integrated with the use of statistical computing packages. See http://www-irland.stanford.edu/class/ed257. Prerequisites: 160, 250A, and 250B, or equivalent. (PSE)

257A. 4 units (Rogosa) not given 1997-98
257B. 3 units (Rogosa) not given 1997-98

259. Seminar in Higher Education—Students learn about different collegiate cultures, are introduced to several common administrative services, discuss and share internship experiences, develop some practical skills needed to work in the collegiate setting, and learn to recognize and valuate some perennial ethical and governance issues on college and university campuses. (SSPEP/APA)

3 units (Lyons) not given 1997-98

261X. Critical Reading in the Content Areas—Topics: introduction to models of reading, functions of literacy, components of reading instruction, content reading vs. recreational reading, literacy vs. expository materials, and reading to learn vs. learning to read; text types; testing and assessment; vocabulary and reading instruction; comprehension and background knowledge; study skills and aids; metacognition; strategies; writing and reading instruction; technological applications; affective concerns and motivations. (LLC)

3 units (Kamil) not given 1997-98

262A, B. Curriculum and Instruction in English—Approaches to teaching English in the secondary school, including goals for instruction, teaching techniques, and methods of evaluation. Prerequisite: STEP student. (STEP)

262A. 3 units, Sum (Vosovic)
262B. 3 units, Win (Staff)

263A, B. Curriculum and Instruction in Mathematics—Purposes and programs of mathematics in the secondary curriculum; teaching materials, methods. Prerequisite: STEP student or consent of instructor. (STEP)

263A. 3 units, Sum (Greeno, Broadkey)
263B. 3 units, Win (Greeno, Humphreys)

264A, B. Curriculum and Instruction in Foreign Languages—Approaches to teaching foreign languages in the secondary school, including goals for instruction, teaching techniques, and methods of evaluation. Prerequisite: STEP student. (STEP)

264A. 3 units, Sum (Azevedo)
264B. 3 units, Win (Azevedo)

266X. Social Science Research Methods in Education—Introduction to social science research methods commonly used in the study of education, primarily for master's students with little or no quantitative background, or who desire an integrated, general introduction to quantitative and qualitative methods in educational research. Objectives: prepare students to be thoughtful consumers of
267A,B. Curriculum and Instruction in Science—Examination of possible objectives of secondary science teaching and related methods: selection and organization of content and instructional materials; lab and demonstration techniques; evaluation, tests; curricular changes; ties with other subject areas. Prerequisite: STEP student or consent of instructor. (STEP)

267A. 3 units, Sum (Atkin, Ortenburger)
267B. 3 units, Win (Atkin, Ortenburger)

268A,B. Curriculum and Instruction in Social Studies—Emphasis is on the methodology of social studies instruction: review of curriculum trends, survey of teaching materials, opportunities to develop teaching and resource units. Prerequisite: STEP student.

268A. 3 units, Sum (Cuban, Swenson)
268B. 3 units, Win (Cuban, Swenson)

270. African-American English in Educational Context—The linguistic and cultural conflicts confronting the majority of African-American students. Interdisciplinary research, emphasizing cross-generational educational needs. Ethnographic studies of schools and their students, and the evolution of educational and linguistic research among African Americans. Prerequisite: graduate student, or consent of instructor. (LLC)

3 units (Baugh) not given 1997-98

273X. Women in Higher Education—Overview of historical, theoretical, and ideological issues related to women's lived experiences as students, faculty, and administrators in higher education, and to the inclusion of feminist scholarship in higher education curricula. (SSPEP/APA)

4 units, Win (Christopher)

274. Learning, Teaching, and Schooling in Japanese Society—Education has been a key to Japan's economic prominence and it is a central factor shaping contemporary society. Topics: socialization, formation of the self, schooling and social structure, classroom practice, educational achievement, learning in corporations, and the state's efforts to shape a national ideology. Comparisons with other nations draw insights into the universal and cultural dimensions of education in industrial societies. (SSPEP/ICE)

3-4 units (Rohlen) not given 1997-98

276. Women and Moral Theory: Feminist Approaches to Ethics and Education—After reading and discussing background material in ethics and feminism, concentrates on ethical problems in education of interest to feminists. Emphasis on an ethic of care. (SSPEP)

4 units, Win (Noddings, Verducci)

277X. Education of Immigrants in Cities—For graduate students; see 177.

4 units, Win (Padilla)

278. Introduction to Issues in Evaluation—Focuses on basic literature and major theoretical and practical issues facing the evaluation field. Topics: evaluation as a branch of experimental science, models of evaluation, quantitative and qualitative approaches to evaluation, evaluation as related to decision-making and the political process, and professional standards of evaluation. (SSPEP)

3 units, Win (Phillips)

279X. Urban Youth and their Institutions: Research and Practice—For graduate students; see 179X. Enrollment limited, consent of instructor required. (SSPEP/APA)

3-5 units (McLaughlin) not given 1997-98

280. Ethnographic Approaches to Cultural Diversity in Schooling—(Same as Anthropology 280.) How to learn about culture and to analyze education-relevant situations such as the culturally diverse classroom. The cultural process is approached by acquiring techniques of observation, interview, and interpretation of behavior in context, and soliciting and recording the "native" explanations of students' own behavior; developing an internally consistent conceptual structure that orients observation and elicitation productively; and being sensitized to one's own culture and how it influences perception and interpretation of behavior. Techniques of ethnographic research applicable to the study of schooling are demonstrated and applied in field research projects. Writing of one research report or proposal for research. (SSPEP)

4 units, Win (Spindler)

281X. Mind, Body, and Spirit: Spiritual Health through the Life Span—For graduate students; see 181X. (PSE)

3 units (Thoresen) not given 1997-98

282. Linguistics and the Teaching of English as a Foreign/Second Language—(Enroll in Linguistics 189/289.) (LLC)

4-5 units, Win (Hubbard)

283. Attitudes toward Languages and Language Study—With language viewed as an intergroup phenomenon, examines attitudes people hold toward their own and different languages, the bias toward and against speakers of different languages, how personal and societal attitudes affect the study and learning of a foreign or second language. A sociopsychological perspective is used as a central
framework to guide the study of attitudes toward language. (LLC)
3-4 units (Padilla)

285. Research Methods in the Social Sciences—Introduction to research methods used in the social sciences. Focuses on the logical structure of research, the nature of evidence, and the process of scientific inquiry. (SSPEP, APA)
3-4 units, Aut (Padilla)

286. Second Language Acquisition Research—Review of major research findings and theories in second language acquisition. Discussion of second language research and theories in formal and informal settings where a second language is learned. (LLC)
4 units, Spr (Padilla)

287. Culture and Learning—Primarily for STEP students. Learning in various institutional settings in America and around the globe. Learning in families, in schools, on the job, and on the streets. Emphasis on the information technologies people use to organize their learning, e.g., the body, language, literacy, money, and the computer as they are embedded in different culture contexts and as they interface with the production technologies that dominate the political order. (SSPEP, STEP)
3 units, Sum (Baugh, Mc Dermott)

290. Leadership in Education: Research and Practice—Conceptions of leadership that include the classroom, school, district office, and state capital. The role complexity of organizational leaders outside of schools, past and present, and how that complexity permitted leadership to arise. Case studies. (SSPEP/APA)
3-4 units (Cuban) not given 1997-98

292. Methods of Teaching Spanish—(Enroll in Spanish 301.) (LLC)
3-5 units (Haro)

293. Methodology of Teaching French—(Enroll in French 260.) (LLC)
3-5 units, Spr (Hester)

295. Psychology of Problem Solving and Reasoning—(Same as Psychology 261.) Introduction to results and methods of research on cognitive processes of solving problems and reasoning. Focus is on accomplishments and limitations of research conducted since 1970, including views of cognition as situated activity. (PSE)
3 units (Greeno) not given 1997-98

297X. Research in Second Language Classrooms—Introduction to qualitative research methods in applied linguistics. Review of classroom-based research on second language teaching and learning. Discussion and critique of research methods including classroom observation, interaction analysis, classroom ethnography, interviews and questionnaires, elicitation techniques, and case studies. Individual projects utilizing data gathered in second language classrooms. (LLC)
3 units (Valdés) not given 1997-98

301. Historiography of American Education—(Same as History 301.) Analysis of the literature of American education history for students who wish to do further work in the field. Weekly colloquium discussions, plus an opportunity to pursue specialized topics in small group tutorial sessions. (SSPEP)
3-4 units (Tyack) not given 1997-98

303. Qualitative Inquiry in Education—The ways in which artistically and humanistically based approaches to the study of teaching, classroom life, and schooling can improve the understanding of education. Introduces qualitative methods of inquiry that emphasize literary and other interpretive forms, and new approaches to inquiry in education. A study using methods. (CTE)
4 units (Eisner) given 1999-2000

304. The Philosophical and Educational Thought of John Dewey—Analysis of important works of
John Dewey. Readings vary each year. Emphasis may be on his social and moral writings. (SSPEP)

4 units, Win (Noddings)

305X. Contemporary Social Philosophy and Ethics: Focus on Community—Introduces current issues in social theory, particularly the debate between liberalism and communitarianism. Attacks on liberalism by feminists and postmodernists, the politics of difference, and the dangers of “strong” communities. (SSPEP/ICE)

4 units, Spr (Noddings)


5 units, Win (Carnoy)

306B. Education and Political Change—Introductory analysis of the relations between education and social and political change from a comparative perspective. Topics: different theoretical approaches to the study of education and politics, questions of legitimacy in educational policy, international factors in educational development, the politics of educational planning and reform, processes and conditions of political learning, and the politics of curriculum and pedagogy. (SSPEP/ICE)

4-5 units, Spr (Mundy)

306C. Cultural Approaches to Technological Innovation and Learning—Technologies and ways of learning in specific cultural and social environments. Anthropological perspectives on the rise of information technologies and their relation to 20th-century systems of measurement, modes of thought, and forms of hegemony. Topics: the walkman, accounting systems, metal, paper, plastic, and electronic currencies, writing systems and literacy, and computerized learning environments. (SSPEP/ICE)

5 units, Spr (Mundy)

306D. World, Societal, and Educational Change: Comparative Perspectives—(Same as 136.) Analysis of the relations between educational and societal developments from a comparative perspective. Readings on varying theoretical perspectives and empirical studies on the structural and cultural sources of educational expansion and differentiation, and on the cultural and structural consequences of educational institutionalization. Research topics: education and nation-building; education, mobility, and equality; education, international organizations, and world culture. (SSPEP/ICE)

5 units, Aut (Ramirez)

308. The Analysis of Teaching—Teaching is often considered an art or craft rather than a science. Is this true? Do teachers function as performers? Videotapes of teachers in action serve as a resource for the analysis of teaching. Concepts and methods from the field of criticism provide tools to analyze teaching. Literature in criticism, aesthetics, and qualitative evaluation secures conceptual tools for the analysis of teaching. (CTE)

4 units (Eisner) not given 1997-98

310. Problems in Sociology of Education—(Same as Sociology 232/330.) For doctoral and master's students. Meets with 210. Emphasis on conceptualizing and analyzing applied sociological research in education. Short written assignments, individual feedback, and work with actual research data. (SSPEP/ICE)

4 units, Win (Cohen)

311X. Seminar for First-Year Doctoral Students—Introduces education as a professional field of study to encourage cross-discipline conversation, and to explore the broad range of methods used in current educational research. (All Areas)

1-2 units, Aut, Spr (Carnoy, Cohen)

312. Interaction Processes in Education: Design and Evaluation—(Same as Sociology 224.) Educational applications of sociological/social psychological theory and research to classroom processes, staff relations, teams, and task forces. The principles for design and evaluations of group work for students and teamwork for teaching staff. Topics: social processes of influence, role differentiation, and evaluation. Methods for systematic evaluation and observation. Students receive practical experience in using these methods. (SSPEP)

4 units, Aut (E. Cohen)

314X. Workshop in Economics of Education—Research by students and faculty engaged in problems in the economics of education. Students must have advanced graduate training in economics theory and methodology and be engaged in research on the topic. (SSPEP/ICE)

1-2 units, Aut, Win, Spr (Carnoy)

317. Research on Teaching—Introduction to theory, methodology, and substantive findings of research on teaching and teacher education. (PSE)

4 units (Staff) not given 1997-98

320. Instruction of Heterogenous Populations—The challenges facing schools having multilingual, multiracial, and multicultural populations, emphasizing critical evaluation of problem statements and proposed solutions. The role of the principal in promoting innovations designed to address these challenges. Issues related to leadership for staff support and training and program coordination. (SSPEP/ICE/SSPEP/APA)

3 units (Cohen) given 1999-2000 and every third year

321A, B. Ethnographic Methods of Educational Research: Concepts, Data Collection, and Analysis—Methods for the empirical analysis of learning in its cultural context. Readings show the theoretical uses of participant observation, interview-
ing, and the detailed analysis of behavioral settings and texts. Fieldwork required. First quarter: key terms for the description of cultural context (state, community, institution, voice, situation, and person). Second quarter: behavior analysis. Registration for separate quarters permitted. Prerequisite: first- or second-year graduate student. (SSPEP/ICE)

321A. 4-5 units (Rohlen) not given 1997-98
321B. 4-5 units, Aut (Linde, McDermott)

322X. Discourse Analysis in Educational Research—Issues and strategies for studying oral and written discourse as a means for understanding classrooms, students, and teachers, and teaching and learning in the context of school. The forms and functions of oral and written language in the classroom, emphasizing teacher-student and peer interaction and student-produced texts. Individual projects utilizing discourse analytic techniques. Prerequisite: graduate status or consent of instructor. (LLC)

5 units (Sperling) not given 1997-98


3 units (Kirst) not given 1997-98

331A,B. Administration and Policy Analysis Research Seminar—Limited to first-year APA doctoral students. Introduces rudiments of problem statements, conceptual frameworks, research design, and critical reviews of literature. (SSPEP/APA)

331A. 1-2 units, Spr (Bridges)
331B. 1-2 units, Aut (Strober)

335X. Language Policy and Planning: National and International Perspectives—For graduate students and undergraduates with consent of instructor. International study of social, political, and educational tensions that shape language policy. Emphasis on language education that affects immigrants, guestworkers, and indigenous linguistic minority populations; policies that determine foreign language instruction and U.S. language policies in a comparative approach. (LLC)

3 units (Fishman) not given 1997-98

338A,B,C. Practicum in Counseling and Health Psychology—For Counseling Psychology majors only. Intensive supervised field experience in local schools or social agencies. (PSE)

338A. 1-6 units, Aut (LaFromboise, Thoresen)
338B. 1-6 units, Win (Krum boltz, LaFromboise, Thoresen)
338C. 1-6 units, Spr (Krum boltz, LaFromboise, Thoresen)

339X. Family Therapy: Systemic Approach to Assessment and Treatment—Doctoral seminar examines the assumptions underlying the family-systems paradigm, viewed as an expansion of and alternative to the individual model. Development of a conceptual framework for family and couples assessment provides the basis for comparing influential models of family therapy. Conceptual, observational, and technical skills needed for family interviewing, the formulation of therapeutic goals, and clinical intervention. Clinical and research application in larger systems (education, health care, business). Meets biweekly. (PSE)

1 unit, Spr (Rait)

340X. Psychology and American Indian Health—Western medicine tends to define health by first defining sickness, disease, or pathology, and then defining health as the absence of these diseases. Native American cultures understood health to mean the balance or beauty of all things physical, spiritual, emotional, and social. Sickness was something out of balance, the absence of harmony. Representative topics in American Indian psychology and health acquaint students with issues that characterize the field, its methods, goals, and findings. Prerequisite: experience working with American Indian communities. (PSE)

3 units (LaFromboise) not given 1997-98

341. Educational Applications of Sociolinguistics—For students interested in the broad applications of linguistic research in educational contexts. Formal integration of sociolinguistics and applied linguistic research is examined in relation to a broad range of international case studies among students and teachers in socially stratified speech communities worldwide. Theoretical concepts from linguistics are introduced as they relate to practical educational problems in socially stratified speech communities. Recommended: background in linguistic science for students who seek to use course as an introduction to applied linguistic research. (LLC)

3 units, Win (Baugh)

343X. Achievement Motivation in School-Aged Children—Surveys developments in the study of achievement motivation in children and adolescents over the past 50 years. The historical and theoretical approaches to understanding the quality, intensity, and direction of children's achievement-related behavior. Clinical life-span theories, cognitive theories, and social-cognitive theories of achievement motivation. Differences among mechanistic, organismic, and developmental-contextual metamodels of motivation, qualitative vs. quantitative conceptualizations of "motivation," and the differential emphasis placed upon organismic needs, cognition, volition, and emotion in theories concerned with understanding achievement behavior. (PSE)

3 units, Win (Roese)
344X. Child Development and Schooling—School represents a major context of development during childhood in the U.S. How the practices and activities of schooling influence the social, emotional, and cognitive development of children. Meta-theoretical approaches (e.g., mechanistic, organismic, developmental contextualist metamodels) and methods of conducting research on schooling and development (experimental, survey, ethnographic, intervention, etc.). Topics: how different teaching practices influence cognitive growth in academic domains, how the organizational structures of schools (grade related transitions, class organizations, etc.) fit (or fail to fit) developmental needs, how friendship groups create contexts for learning and can lead to different trajectories of development, and how grading and other evaluative practices influence motivational orientations. Focuses on the elementary school years (see also 345X). (PSE)

3 units, Win (Barron)

345X. Adolescent Development and Schooling—School represents a major context of development during adolescence in the U.S. How the context of school and its relationship to other major contexts development (family, peer group, and neighborhood) influence the social, emotional, and cognitive development of secondary school-aged youths. Meta-theoretical approaches (e.g., mechanistic, organismic, developmental contextualist metamodels) and methods of conducting research on schooling and development (laboratory, survey, ethnographic, intervention, etc.). Topics: school transitions during adolescence, the role of school functioning in broader patterns of competence or distress, and how the organization of academic tasks, classrooms, and school environments as a whole can influence different aspects of adolescent development. Focuses on the middle and high school years (see also 344X). (PSE)

3 units, Spr (Roeser)

346. Research Seminar in Higher Education—Required for Higher Education students. Overview of research perspectives on the U.S. system of higher education and how it evolved. Central questions: What are the structural and cultural features of contemporary system? How did organizational structures and purposes get defined? How and why have they changed? Examines research in topic areas (e.g., organization and governance, faculty, students, curriculum) and recurrent system-wide issues (e.g., stratification, decentralization, excellence, and diversity). (SSPEP/APA)

4 units, Aut (Christophef)

350A. Psychological Studies in Education—Required of first-year doctoral students in Psychological Studies; others by consent of instructor. Introduction to the doctoral program in Psychological Studies in Education and to faculty and student research. (PSE)

1 unit, Aut (Greeno)

350B,C,D. Research Practicum in Psychological Studies in Education—Five-quarter sequence provides students in PSE an opportunity to engage in all facets of the research process. Individual projects in a group context are designed to provide extensive opportunities for training and feedback concerning specific projects and the general enterprise of psychological research in education. 350B and C are required of first-year students in PSE; 350D is required of second-year students in PSE. Others by consent of instructor. (PSE)

350B. 3 units, Win (Calfee, Krumboltz)
350C. 3 units, Spr (Thoreson, Hakuta)
350D. 1 unit, Aut, Win, Spr (Roeser)

351. Design and Analysis of Longitudinal Research—The analysis of longitudinal data is central to empirical research on learning and development. Topics: growth models, measurement of change, repeated measures designs, quasi-experiments, structural regression models, reciprocal effects, analysis of durations including survival analysis. See http://www-leland.stanford.edu/class/ed351/longit/. Prerequisite: statistical training at least at the level of 257. (PSE)

3 units (Rogosa) not given 1997-98

353A. Problems in Measurement: Item Response Theory—Survey of alternative mathematical models used in test construction, analysis, and equating. Emphasizes applications of item response theory (latent trait theory) to measurement problems, including estimation of item parameters and person abilities, test construction and scoring, tailored testing, mastery testing, vertical and horizontal test equating, and detection of item bias. Prerequisites: 252 and 257 or Psychology 248 and 252, or equivalent. (PSE)

3 units (Haertel) not given 1997-98

353C. Problems in Measurement: Generalizability Theory—Theory and application of generalizability theory to the analysis of educational achievement data, including performance assessments. Fundamental concepts, computer programs, and actual applications. (PSE)

3 units, Win (Haertel)

354X. School-Based Decision Making—Leadership and organizational issues in the movement toward school-based decision making. Emphasizes building capacity for individual schools to make decisions, establishment of an inquiry process at the school level, use and availability of information, implementation and evaluation of decisions, parental involvement, support of school-based decisions by districts. (SSPEP/APA)

3 units (Levin) not given 1997-98

356X. Research Seminar on Educational Organizations—For doctoral students interested in applying ideas from organizational theory to educational organizations. Focuses on appropriateness of different theoretical perspectives for studying se-
selected aspects of educational organizations. Students work with organizational ideas and must have completed basic course work in research methods. (SSPEP/APA)

359A, B, C, D. Research in Science and Mathematics Education—Participants gain familiarity with research in science education, with references to mathematics education and other school subjects as appropriate. Historical and international perspectives; emphasis is on trends and issues in contemporary American research and policy. Seminars offer an opportunity to develop and discuss dissertation plans, but are not limited to those students. (CTE)

359A. Assessment and Evaluation
2 units, Win (Atkin, Shavelson)

359B. Instruction
2 units (Staff) not given 1997-98

359C. Curriculum
2-3 units (Staff) not given 1997-98

359D. Teacher Education
2 units (Staff) not given 1997-98

360X. Action Research in Education—Introduction to the theory and practice of action research. Basic concepts and methods; historical and ideological influences on this form of inquiry by teachers. Participants analyze action research reports and engage in a small-scale action-research project. (CTE)

3 units, not given 1997-98

361. The Economics of Gender in Education and Employment—Policy issues concerning higher education, employment, earnings, discrimination, occupational segregation, housework, childcare, affirmative action, comparable worth, and feminist economics. (SSPEP)

3 units (Strober) not given 1997-98

364X. Reading in a Second Language—Examination of the theories and research related to learning to read in a second language in child and adult learning contexts. The similarities and differences between first- and second-language theories and research on learning to read. Applications of research findings to pedagogy. (LLC)

3 units (Kamil) not given 1997-98

366X. Trends and Issues in Reading—Current trends and issues in literacy and literacy instruction; provides a framework for work in reading and literacy. Research, theory, and implications for practice in classroom organization, compensatory instruction, comprehension instruction, reading and writing assessment, second language reading, whole language emergent literacy, adult literacy, and technology. (LLC)

3 units, Aut (Kamil)

369. Personnel Administration—Topics: selection, supervision, evaluation, and staff development. The legal, social science, and educational aspects of these topics. Connects theory and practice through use of problem-based learning. (SSPEP/APA)

4 units (Bridges) not given 1997-98

372X. Social Processes in Learning and Development—Doctoral seminar on how children's learning and development are influenced by social interactions with parents, peers, teachers, and the larger cultural context. Emphasis is on research that illuminates social/cognitive processes thought to influence the development of individual thinking. These processes include observation and imitation of models, co-construction of meaning and achievement of intersubjectivity, providing and receiving explanations, and socio-cognitive conflict. How the larger social culture influences the behavior of individuals in interaction and on how forms of school culture influence children's individual thinking and thinking in collaboration with others. (PSE)

3 units, Spr (Barron)

373. Education as a Social Science—Enrollment limited to and required of all first-year Ph.D. students in SSPEP. Students meet with faculty on the area committee, are oriented to the range of intellectual and research strategies represented by the social sciences faculty, and interview faculty and plan with them the topic of discussion of their course session. Assists students in course planning. Opportunity to develop sessions to meet orientation and adjustment needs, as they arise. (SSPEP)

1 unit, Aut (Cohen)

375X. Organizational Development: Theory and Practice—(Same as Business 375.) Designed to develop familiarity with the theory and practice of planned organizational change through case analyses, role plays, simulations, etc. (SSPEP/APA)

4 units (Staff) not given 1997-98

376. Education and Theories of the State—Examines the relationship between political system structures and educational change by analyzing theories and interpretations of how political systems function and the implications of these theories for understanding education. Classical and Marxist interpretations. (SSPEP/ICE)

5 units (Carnoy) not given 1997-98

379X. Public Policy toward Abused and Neglected Children—Standards that are, and should be, used in defining child abuse and neglect and evaluating means of state intervention to protect such children. Role of various professionals (doctors, lawyers, mental health workers, police, and social workers) in dealing with problems of child abuse and neglect. Types of research currently being done and identification of new research directions. Limited to 20 graduate and law students and meets for 15 weeks under Law School semester system. Prerequisite: consent of instructor. (SSPEP/APA)

5 units (Wald) not given 1997-98
380. Supervised Internship
any quarter (Staff)

384. Advanced Topics in Higher Education—
Preference given to higher education graduate stu-
dents. In-depth analysis of selected topics in the
study of higher education. Topics vary each year
among faculty development, legal issues, curricular
change, knowledge production, professional social-
ization, management of organizational decline, lead-
ership and innovation, authority and power, diver-
sity and equity, interactions with government and
industry. Prerequisites: 346, consent of instructor.
(SSPEP/ICE)

4 units, Spr (Gumport)

387A,B,C. Workshop: Comparative Systems—
(Same as Sociology 330.) Analysis of quantitative
and longitudinal data on national educational sys-
tems and political structures. Prerequisite: consent
of instructor. (SSPEP/ICE)

387A. 2-5 units, Aut (Ramirez, Meyer)
387B. 2-5 units, Win (Ramirez, Meyer)
387C. 2-5 units, Spr (Ramirez, Meyer)

388A,B. Bilingual Education—Research issues of
policy and practice, particularly in the U.S., in
programs for language minority students. Topics:
the history of policy and legislation in bilingual
ducation, theories of second language learning and
first language maintenance, research on the effect-
eness of bilingual education, and comparative
experiences in other societal settings. (LLC, STEP)

388A.—Prepares STEP students for CLAD cer-
tification.

3-4 units, Spr (Hakuta)
388B.—For LLC students.
3 units, Win (Hakuta)

390. Advanced Seminar in Bilingual Education—
For doctoral students specializing in bilingual edu-
cation. Topical treatment of current research and
policy issues in bilingual education. Prerequisite:
388B or consent of instructor. (LLC)

1-3 units, Spr (Hakuta) not given 1997-98

406X. Topics in Comparative Educational Re-
search—Primarily for doctoral students. Possible
topics: from substantive foci (e.g., gender issues,
childhood socialization, numeracy) to a systematic
treatment of a major educational theorist (e.g., Bern-
stein, Bourdieu). (SSPEP/ICE)

2-3 units (Ramirez) not given 1997-98

407X. Aid and Education: The African Case—
Advanced seminar on international educational aid,
primarily for doctoral students. Focuses primarily
on educational aid in sub-Saharan Africa, the region
most often considered in contemporary debates
about the failure of aid, and the "impasse in devel-
opment theory." (SSPEP/ICE)

4 units (Mundy) not given 1997-98

408. Research Workshop in International and
Comparative Education—Limited to advanced
doctoral students in ICE and SSPEP. Research
workshop for the review of key issues in the meth-
dology and epistemology of social research in
education, research proposals, and findings by stu-
dents and faculty. Prerequisites: 306A,B,C,D or
equivalent. (SSPEP/ICE)

2-5 units, Win (Carnoy)

410. Topics in Symbolic Systems in Education—
For students in all areas. Topics in the interdiscipli-
ary study of intelligence, information, meaning,
and learning, emphasizing research relevant to ed-
ucational practice. Research perspectives from an-
thropology, artificial intelligence, linguistics, phi-
losophy, and psychology. (PSE)

1 unit, Aut, Win, Spr (Staff)

415. Seminar in Educational Psychology—Topi-
cal seminar for advanced students. Prerequisite:
consent of instructor. (PSE)

3 units, Spr (Calfee)

416. Seminar on Aptitude—Limited to doctoral
students in education and psychology. Study of
individual differences in learning, cognitive, con-
notative, and affective processes related to educa-
tion. Design and evaluation of instruction with
respect to individual differences. Prerequisites: 255 or
equivalent, and consent of instructor. (PSE)

3 units, Spr (Staff)

418. Foundations of Field Research in Higher
Education—For higher Education/APA graduate
students. Advanced seminar examines rationales
for doing interpretive social science research in
higher education settings. Students acquire method-
ological training in fieldwork through hands-on
opportunities to collect, analyze, and critique case
study data obtained from interviews, observation,
and document analysis. Appropriate for doctoral
students working on qualifying papers or disserta-
tions. Prerequisites: 346, consent of instructor.
(SSPEP/APA)

3-5 units, Spr (Christopher)

420A,B,C. Advanced Seminar in Philosophy of
Education—Seminar on particular issues during
designated quarters. Enrollment limited; sign up
with instructor prior to beginning of quarter. (SSPEP)

420A. 1-3 units, Win (Noddings)
420B. Prerequisite: 420A.
1-3 units, Spr (Noddings)
420C. Focuses on constructionist theories in
philosophy, psychology, and education.
1-3 units, Spr (Phillips, Suppes)

422A,B,C. Practicum for School Principals—
The major tasks and related activities of principals.
Uses a training approach that is problem rather than
discipline based and provides for a substantial de-
gree of self-directed learning by students under the
guidance of professors and practicing principals. (SSPEP/APA)

6 units, Sum (Bridges, Hill)

**423A. Introduction to Research Design: Educational Administration and Policy Analysis**—Preference to APA doctoral students working on their sixth-quarter qualifying paper. Focuses on the key issues in conceptualizing and designing research in the social sciences. (SSPEP/APA)

3-5 units, Win (Strober)

**431. Doctoral Seminar: Counseling and Health Psychology**—Analysis of professional problems. May be repeated for credit. Prerequisites: doctoral candidates in counseling psychology, consent of instructor. (PSE)

1 unit, Aut, Win, Spr (Krumholz, LaFromboise, Thoresen)

**444X. Research in Progress: Curriculum and Teacher Education**—Required of first- and second-year doctoral students in CTE. Introduction to current research in the Curriculum and Teacher Education area. Presentations of research planned, under way, or ready to be reported on some aspect of curriculum and teacher education. Weekly presentations by SUSE faculty, SUSE masters' or doctoral candidates, and faculty from elsewhere in the University or Bay Area. Questions and discussion of conceptual and methodological issues. (CTE)

1 unit, Aut, Win, Spr (Staff)

**453. Doctoral Dissertation**—(All Areas)

1-15 units, any quarter (Staff)

**460. Advanced Seminar in Evaluation Design**—Three-quarters; for A.M. Policy Analysis and Evaluation students in the evaluation track. Discussion about evaluation issues, including the significance of multidisciplinary teamwork, design issues, negotiation, interpersonal skills, and ethics. (SSPEP/APA)

1 unit, Aut, Spr (Fetterman)

Win (Phillips)

**466. Doctoral Seminar in Curriculum**—Required of all doctoral students in CTE. Opportunity to become acquainted with research in the field, student research activities, and the kinds of problems they believe important in the field. Introduces research and scholarship related to the CTE program at Stanford. All CTE faculty, other Stanford faculty, and outside speakers participate. Major problems in the field and the ways these are addressed by current investigators. (CTE)

2-4 units, Win (Eisner)

**470. Practicum**—For advanced graduate students, (All Areas)

1-15 units, any quarter (Staff)

**470E. Practicum in Evaluation**—Topics of current interest in the area of educational evaluation. Prerequisite: student member of the Evaluation Consortium. (All Areas)

1-15 units, any quarter (Staff)

**480. Directed Reading**—For advanced graduate students. (All Areas)

1-15 units, any quarter (Staff)

**490. Directed Research**—For advanced graduate students

1-15 units, any quarter (Staff)

**493B. Statistical Methods for Meta-Analysis**—(Same as Health Research and Policy 206, Statistics 211.) Meta-analysis is a quantitative method for combining results of independent studies, and enables researchers to synthesize the results of related studies so that the combined weight of evidence can be considered and applied. Examples from the medical, behavioral, and social sciences. Topics: literature search, publication and selection bias, statistical methods (contingency tables, cumulative methods, sensitivity analyses, non-parametric methods). Project required. Prerequisites: basic sequence in statistics and consent of instructor. (All Areas)

1-3 units, Win (Olkin)

**493S. Further Topics in Statistical Methods for Behavioral and Social Sciences**—Advanced study which continues some topics from 257 and is available to qualified students from prior 257 offerings. Organizational meeting and four bi-weekly 2-hour lecture/discussion classes. Credit for classes and for completion of a data analysis problem set based on content. (PSE)

1-3 units (Rogosa) not given 1997-98
Dean: John L. Hennessy
Senior Associate Deans: John C. Bravman (Student Affairs), Anthony J. DiPaolo (SCPD), Anne R. Gaddy (Administration), Joseph W. Goodman (Faculty Affairs)
Associate Deans: Noé P. Lozano (Minority and Affirmative Action Programs)
Assistant Deans: Susan Clement (Graduate Student Affairs), Rene Cortinaz (Human Resources)

Faculty Teaching General Engineering Courses
Emeriti: (Professors) Daniel DeBra, Gene Franklin
Professors: Donald Baganoff, David M. Barnett, John C. Bravman, Mark R. Cutkosky, Gerald Fuller, George M. Homsy, James V. Jucker, Robert E. McGinn, Mark Godfrey Mungal, Peter M. Pinsky, J. David Powell, Robert Sinclair
Associate Professors: Margaret L. Brandeau, David L. Freyberg, Anoop Gupta, Bruce B. Lusignan, Reginald E. Mitchell, Stephen G. Monismith, Stephen M. Rock, Sheri D. Shepard
Assistant Professor: Jonathan How
Professor (Research): Butrus T. Khuri-Yakub
Professors (Teaching): Gilbert M. Masters, Eric S. Roberts
Senior Lecturer: David Lougee
Lecturer: Robert Plummer
Consulting Associate Professors: Thomas H. Byers, Robert T. Jones, Richard Reis
Visiting Associate Professor: Sultan A. Bhimjee

The School of Engineering offers undergraduate programs leading to the degree of Bachelor of Science (B.S.), programs leading to both B.S. and Master of Science (M.S.) degrees, other programs leading to a B.S. with a Bachelor of Arts (A.B.) in a field of the humanities or social sciences, dual-degree programs with certain other colleges, and graduate curricula leading to the degrees of M.S., Engineer, and Ph.D.

The school has nine academic departments: Aeronautics and Astronautics, Chemical Engineering, Civil and Environmental Engineering, Computer Science, Electrical Engineering, Engineering-Economic Systems and Operations Research, Industrial Engineering and Engineering Management, Materials Science and Engineering, and Mechanical Engineering. These departments and one interdisciplinary program, Scientific Computing and Computational Mathematics, are responsible for graduate curricula, research activities, and the departmental components of the undergraduate curricula. In research, where faculty interest and competence embrace both engineering and the supporting sciences, there are numerous programs within the school as well as several interschool activities, including the Center for Integrated Systems, Center for Materials Research, Center for Space Science and Astrophysics, Institute for Electronics in Medicine, Joint Institute for Aeronautics, Microwave Laboratory, a program in Product Design, Radio Astronomy Institute, and the Stanford Institute for Manufacturing and Automation. Petroleum Engineering is offered through the School of Earth Sciences.

Instruction in engineering is offered primarily during the Autumn, Winter, and Spring Quarters of the regular academic year. During the Summer Quarter, a small number of undergraduate and graduate courses are offered.

UNDERGRADUATE ADMISSION

Students admitted to the University may declare a major in the School of Engineering if they elect to do so; no additional courses or examinations are required for admission to the School.

RECOMMENDED PREPARATION

FRESHMEN

Students who plan to enter Stanford as freshmen and intend to major in engineering should take the highest level of mathematics offered in high school. (See the “Mathematics” section of this bulletin for information on advanced placement in mathematics.) High school courses in physics and chemistry are strongly recommended but not required. Additional elective course work in the humanities and social sciences is also recommended.

TRANSFER STUDENTS

Students who do the early part of their college work elsewhere and then transfer to Stanford to complete their engineering programs should follow an engineering or pre-engineering program at the first school, selecting insofar as possible courses applicable to the requirements of the School of Engineering, that is, courses comparable to those described below under “Undergraduate Programs.” In addition, students should work toward completing the equivalent of Stanford’s foreign language requirement and as many of the University’s General Education Requirements (GERs) as possible before transferring. Some transfer students may require more than four years to obtain the B.S. degree. However, Stanford affords great flexibility in planning and scheduling individual programs which makes it possible for
transfer students, who have wide variations in preparation, to plan full programs for each quarter and to progress toward graduation without undue delay.

Transfer credit is given for courses taken elsewhere whenever the courses are equivalent or substantially similar to Stanford courses in scope and rigor. The policy of the School of Engineering is to study each transfer student's preparation and make reasonable evaluation of the courses taken prior to transfer. Inquiries may be addressed to the Senior Associate Dean for Student Affairs in the School of Engineering at Stanford.

3/2 DEGREE PROGRAMS

The 3/2 engineering program at Stanford is a special opportunity that allows a student to complete three years at a liberal arts college followed by two years at Stanford. After completing the five-year program, the student is awarded two degrees, a B.S. in Engineering from Stanford and an A.B. from the liberal arts college.

Candidates for this special dual-degree program are considered as regular transfer applicants and are expected to meet the same admissions standards as all other transfer candidates. This distinguishes the Stanford 3/2 program from those of most other institutions that "guarantee" admission to students who meet certain grade and course requirements and are recommended by the 3/2 coordinator of the liberal arts college.

All 3/2 transfer applicants are required to submit the transfer application forms, a final secondary school transcript, official transcripts from each college attended, and the official results of either the College Board Scholastic Aptitude Test (SAT) or the American College Test (ACT). All materials must be submitted by the regular transfer deadline.

In addition to the above mentioned documents, dual-degree candidates are required to have a letter of recommendation sent from the liberal arts college 3/2 program coordinator. Also required is a letter from the appropriate academic dean indicating the intention of the liberal arts college to award the A.B. degree, not the B.S. degree, upon completion of the required number of course credits. Applications are only accepted from students attending a liberal arts college that does not offer a degree program in engineering.

UNDERGRADUATE PROGRAMS

The principal goals of the undergraduate engineering curriculum are to provide opportunities for intellectual growth in the context of an engineering discipline, for the attainment of professional competence, and for the development of a sense of the social context of technology. The curriculum is sufficiently flexible that a number of decisions on individual courses are left to the student and the adviser. For a student with well-defined educational goals, there is often a great deal of latitude.

In addition to the special requirements for engineering majors described below, all undergraduate engineering students are subject to the University general education, writing, and foreign language requirements outlined in the first pages of this bulletin. Depending on the program chosen, students have the equivalent of from one to three quarters of free electives to bring the total number of units to 180.

The School of Engineering's Handbook for Undergraduate Engineering Programs, available from the Office of Student Affairs in Terman Engineering Center, provides detailed descriptions of all undergraduate programs in the school, as well as additional information about extracurricular programs and services.

Note—Because the handbook is published in the summer, it reflects the most up-to-date information for the academic year and is the definitive guide for all undergraduate engineering programs.

BACHELOR OF SCIENCE

Departments within the School of Engineering offer programs leading to the B.S. degree in the following fields: Chemical Engineering, Civil and Environmental Engineering, Computer Science, Electrical Engineering, Industrial Engineering, Materials Science and Engineering, and Mechanical Engineering. The School of Engineering itself offers interdisciplinary programs leading to the B.S. degree in Engineering with specializations in Aeronautics and Astronautics, Computer Systems Engineering, and Product Design. In addition, students may elect an Individually Designed Major leading to the B.S. in Engineering.

ACCREDITATION

The Accreditation Board for Engineering and Technology (ABET) accredits college engineering programs nationwide using criteria and standards developed and accepted by U.S. engineering communities. At Stanford, the following undergraduate curricula are accredited: Chemical Engineering, Civil and Environmental Engineering, Electrical Engineering, Industrial Engineering, and Mechanical Engineering. In ABET-accredited departments, students must meet specific requirements for engineering science, engineering design, mathematics, and science course work. Students are urged to consult the School of Engineering Undergraduate Handbook and their adviser.

Accreditation is important in many areas of the engineering profession; students wishing more information about accreditation should consult their department office or the office of the Senior Associate Dean for Student Affairs in Terman 208.
POLICY ON SATISFACTORY/NO CREDIT GRADING AND MINIMUM GRADE POINT AVERAGE

All courses taken to satisfy major requirements (including the requirements for mathematics, science, engineering fundamentals, Technology in Society, and engineering depth) for all engineering students (including both department and School of Engineering majors) must be taken for a letter grade if the instructor offers that option.

For departmental majors, the minimum GPA (grade point average) for all courses taken in fulfillment of the Engineering Fundamentals requirement and the Engineering Depth requirement is 2.0. For School of Engineering majors, the minimum GPA on all engineering courses taken in fulfillment of the major requirements is 2.0.

DEPARTMENTAL MAJORS

Curricula for majors offered by the Departments of Chemical Engineering, Civil and Environmental Engineering, Electrical Engineering, Industrial Engineering and Engineering Management, Materials Science and Engineering, and Mechanical Engineering have the following components: 40-47 units of mathematics and science (see Notes 1 and 2 at the end of this section); engineering fundamentals (five course minimum, see Note 3); Technology in Society (TIS) (one course minimum, see Note 4); engineering depth (courses such that the total of units for Engineering Fundamentals and Engineering Depth is between 60 and 75). Included within the courses taken to fulfill the preceding curriculum components is a requirement for a minimum of 8 units of experimentation (see below). Curricular requirements for departmental majors were being revised at the time of publication. Please consult the 1997-1998 Handbook for Undergraduate Engineering Programs for the most up-to-date listing of curricular requirements.

The curriculum for the major offered by the Department of Computer Science has separate requirements as described below.

EXPERIMENTATION

Departmental major programs other than Computer Science must include 8 units of experimentation. Lab courses taken in the sciences as well as experimental work taken in courses within the School of Engineering can be used in fulfillment of this requirement. By careful planning, the experimentation requirement should not necessitate additional course work beyond that required to meet the other components of an engineering major. A list of courses and their experimentation content (in units) can be found in the Handbook for Undergraduate Engineering Programs.

CHEMICAL ENGINEERING

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics:</td>
<td></td>
</tr>
<tr>
<td>Math. 41, 42, 43. Calculus and Analytic Geometry</td>
<td>15</td>
</tr>
<tr>
<td>Math. 44. Calculus</td>
<td>3</td>
</tr>
<tr>
<td>Math. 130. Ordinary Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>Science:</td>
<td></td>
</tr>
<tr>
<td>Chem. 31. Chemical Principles</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 33. Structure and Reactivity</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 35. Organic Monofunctional Compounds</td>
<td>3</td>
</tr>
<tr>
<td>Chem. 36. Chemical Separations</td>
<td>3</td>
</tr>
<tr>
<td>Chem. 131. Organic Polyfunctional Compounds</td>
<td>3</td>
</tr>
<tr>
<td>Phys. 41. Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>Phys. 43. Electricity</td>
<td>3</td>
</tr>
<tr>
<td>Phys. 45. Magnetism</td>
<td>3</td>
</tr>
<tr>
<td>Phys. 47. Light and Heat</td>
<td>4</td>
</tr>
<tr>
<td>Engineering Fundamentals:</td>
<td></td>
</tr>
<tr>
<td>Five courses from a list of six*</td>
<td>19-22</td>
</tr>
<tr>
<td>Technology in Society: 1 course (See Note 4)</td>
<td></td>
</tr>
<tr>
<td>Chemical Engineering Depth:</td>
<td></td>
</tr>
<tr>
<td>Chem. 130. Theory and Practice of Identification</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 171. Physical Chemistry: Chemical Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>Chem. 173. Physical Chemistry: Quantum Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>Chem. 175. Physical Chemistry: Kinetics and Statistical Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 100. Chemical Process Modeling</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 110. Equilibrium Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 120. Separation Processes</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 130. Kinetics and Reactor Design</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 140. Fluid Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>Chem. Engr. 150. Energy and Mass Transport</td>
<td>4</td>
</tr>
<tr>
<td>Chem. Engr. 170. Polymer Science and Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 180A.B. Chemical Engineering Laboratory</td>
<td>6</td>
</tr>
<tr>
<td>Engr. 20. Introduction to Chemical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Restricted Elective†</td>
<td>3-4</td>
</tr>
</tbody>
</table>

Total .................................................. 51-52

* Students must choose five courses from Engr. 14 or 15, 30, 40, 50, 60 or 62, 70A or 70X.
† Students must choose one course from the following list:

Engr. 104, 105, 110, 120
CEE. 101A,B,C, 161, 162, 163, 172, 180A,B
Comp. Sci. 108, 137
Elect. Engr. 101, 102, 103, 105, 111, 112, 113, 121, 122, 133, 141, 142
Mat. Sci. & Engr. 151, 152, 191, 192, 193, 194, 195, 196, 197, 198, 199
Mech. Engr. 33, 111, 117, 118, 130,
Pet. Engr. 172
Note: to be accepted, Mech. Engr. 33 and Civ. & En-
vir. Engr. 101B must be completed prior to Chem.
Engr. 140; graduate courses in engineering or com-
puter science are considered only by petition.

CIVIL AND ENVIRONMENTAL
ENGINEERING (CEE)

Mathematics and Science:
45 units minimum* (See Notes 1 and 2)
Technology in Society: one course: (See Note 4)
Engineering Fundamentals:
five courses† (see Note 3) 17-19
Engineering Depth:
CEE 100. Managing Civil Engineering Projects 4
CEE 101A. Structural Systems 4
CEE 101B. Mechanics of Fluids 4
CEE 101C. Geotechnical Engineering 4
CEE 110. Analysis and Numerical Modeling of
Civil Engineering Systems 4
CEE 170. Environmental Science
and Technology 3
Specialty courses in either
Environmental and Water Studies**,
or Structures and Construction†† 26-28
Total for Engineering Fundamentals plus Depth... 68

* Mathematics must include Mech. Engr. 100 and Stat.
190. Science must include Physics 41 or equivalent,
Chem. 31, and Geol. & Envr. Sci. 1. For students
in Environmental and Water Studies, Chem. 33 and
either Chem. 35 or 135 are also required.
† Fundamentals must include Engr. 14 and 60. In
addition, students selecting the Environmental and
Water Studies option must take Engr. 30; those in
Structures and Construction must take Engr. 50.
** Environmental and Water Studies: CEE 160, 161,
162, 163, 169, 171, 172, and 176A.
†† Structures and Construction: CEE 102, 156, 180A,
180B, 181, and 182, and remaining specialty units
from the following: Engineering 15; CEE 122, 140,
153, 160, 161, 162, 171, 174, 176A, 176B, 195,
196, 199, 203.

COMPUTER SCIENCE (CS)

Mathematics: (27 units)
CS 157. Logic and Automated Reasoning
or Phil. 160A. First Order Logic 4
Math. 41, 42, 51. Calculus 15
Math. 103 or 113. Linear Algebra* 3
Stat. 116 5
Science: (12 units)
Phys. 41. Mechanics 3
Phys. 43. Electricity 3
Phys. 45. Magnetism 3
Science Elective† 3
Engineering Fundamentals: (10 units)
CS 106X. Programming Methodology and
Abstractions (Accelerated)
or CS 106A and 106B 5
Engr. 40. Electronics 5
Technology in Society: (3-5 units)
one course** (See Note 4)
Computer Science Courses: (48 units)
CS 107. Programming Paradigms 5
CS 108. Object-Oriented Systems Design 4
CS 109. Introduction to Computer Science 4
CS 143. Compilers 4
CS 154. Introduction to Automata and
Complexity Theory 4
CS 161. Data Structures and Algorithms 4
CS 121 or 221. Introduction to Artificial
Intelligence 3
CS 240A. Operating Systems 4
Elect. Engr. 182. Computer Organization 4
Computer Science electives†† 9
Senior Project (CS 191, 194, or 195B)*** 3

* Math. 52 or 53 may be taken in place of the Math.
103/113 requirement.
† Other science courses are to be taken from the
School of Engineering list (see note 2), plus Psych.
30, 40 or AP Chemistry credit. Physics 61 and 63
or Physics 21 and 23 may be taken instead of Physics
41, 43 and 45, as long as a total of 12 science units
are taken.
** CS 201 also fulfills this requirement.
†† A list of approved electives is reviewed annually.
The current list consists of: CS 110, 137, 145, 147,
148 or 248, 195A, 222, 223A, 223B, 224, 225,
227, 228, 229, 240B, 242, 243, 244A, 245A, 245B,
247A, 247B, 249, 256, 257, 258, 261; and Elect.
Engr. 282.

ELECTRICAL ENGINEERING (EE)

Mathematics: 21 units minimum* (See Note 1)
Science: 20 units minimum** (See Note 2)
Engineering Fundamentals*** (See Note 3)
Technology in Society: one course (See Note 4)
Engineering Depth:
Circuits and Systems: EE 101, 102, 103, 180A,
180B, 181, and 182, and remaining specialty units
from the following: Engineering 15; CEE 122, 140,
153, 160, 161, 162, 171, 174, 176A, 176B, 195,
196, 199, 203.

COMPUTER SCIENCE (CS)

Mathematics: (27 units)
CS 157. Logic and Automated Reasoning
or Phil. 160A. First Order Logic 4
Math. 41, 42, 51. Calculus 15
Math. 103 or 113. Linear Algebra* 3
Stat. 116 5
Science: (12 units)
Phys. 41. Mechanics 3
Phys. 43. Electricity 3
Phys. 45. Magnetism 3
Science Elective† 3
Engineering Fundamentals: (10 units)
CS 106X. Programming Methodology and
Abstractions (Accelerated)
or CS 106A and 106B 5
Engr. 40. Electronics 5
Technology in Society: (3-5 units)
one course** (See Note 4)
Computer Science Courses: (48 units)
CS 107. Programming Paradigms 5
CS 108. Object-Oriented Systems Design 4
CS 109. Introduction to Computer Science 4
CS 143. Compilers 4
CS 154. Introduction to Automata and
Complexity Theory 4
CS 161. Data Structures and Algorithms 4
CS 121 or 221. Introduction to Artificial
Intelligence 3
CS 240A. Operating Systems 4
Elect. Engr. 182. Computer Organization 4
Computer Science electives†† 9
Senior Project (CS 191, 194, or 195B)*** 3

* Math. 52 or 53 may be taken in place of the Math.
103/113 requirement.
† Other science courses are to be taken from the
School of Engineering list (see note 2), plus Psych.
30, 40 or AP Chemistry credit. Physics 61 and 63
or Physics 21 and 23 may be taken instead of Physics
41, 43 and 45, as long as a total of 12 science units
are taken.
** CS 201 also fulfills this requirement.
†† A list of approved electives is reviewed annually.
The current list consists of: CS 110, 137, 145, 147,
148 or 248, 195A, 222, 223A, 223B, 224, 225,
227, 228, 229, 240B, 242, 243, 244A, 245A, 245B,
247A, 247B, 249, 256, 257, 258, 261; and Elect.
Engr. 282.

ELECTRICAL ENGINEERING (EE)

Mathematics: 21 units minimum* (See Note 1)
Science: 20 units minimum** (See Note 2)
Engineering Fundamentals*** (See Note 3)
Technology in Society: one course (See Note 4)
Engineering Depth:
Circuits and Systems: EE 101, 102, 103, 180A,
180B, 181, and 182, and remaining specialty units
from the following: Engineering 15; CEE 122, 140,
153, 160, 161, 162, 171, 174, 176A, 176B, 195,
196, 199, 203.

* Mathematics must include Mech. Engr. 100 and Stat.
190. Science must include Physics 41 or equivalent,
Chem. 31, and Geol. & Envr. Sci. 1. For students
in Environmental and Water Studies, Chem. 33 and
either Chem. 35 or 135 are also required.
† Fundamentals must include Engr. 14 and 60. In
addition, students selecting the Environmental and
Water Studies option must take Engr. 30; those in
Structures and Construction must take Engr. 50.
** Environmental and Water Studies: CEE 160, 161,
162, 163, 169, 171, 172, and 176A.
†† Structures and Construction: CEE 102, 156, 180A,
180B, 181, and 182, and remaining specialty units
from the following: Engineering 15; CEE 122, 140,
153, 160, 161, 162, 171, 174, 176A, 176B, 195,
196, 199, 203.
** Science is to include one course in both physics and chemistry. Science and math units must total at least 46.

† † Three courses from one of the specialty areas shown below (consultation with an adviser in the selection of these courses is especially important):
- Computer Hardware: Comp. Sci 107; EE 182, (183 or 281), 271
- Computer Software: Comp. Sci. 107, 108, 205, 206, 209
- Electronics: EE 133, 212, 214, 216
- Fields and Waves: EE 142, 144, 241, 242, 246, 247, 252
- Signal Processing: EE 133, 261, 264, 278; Stat. 116

Total Specialty Units 9-12 units

*** Engineering Fundamentals should include Engr. 40 and 70X.

INDUSTRIAL ENGINEERING (IE)

Mathematics: 22 units minimum *(See Note 1)
- Math. 41 5
- Math. 42 5
- Math. 43 5
- Math. 44 5
- Math. 48 5

Science: 18 units minimum *(See Note 2)
- Chem. 31 4
- Physics 41 3
- Physics 43 3
- Physics 45 3
- Physics 46 1

Engineering Fundamentals:
- five courses† (See Note 3)

Technology in Society: one course (See Note 4)

Engineering Depth:
- Engr. 62 Introduction to Optimization 4

Total 46

* Math and science must total 45 units. Electives must come from approved list.
† Engineering Fundamentals Courses must include Engr. 40, 60, and 70A.
†† Students must take two courses from the following list, and at least one of these must be one of the courses marked by an asterisk: Chem. Engr. 160; Civ. & Envir. Engr. 100; Comp. Sci. 147; Engr. 1; Engr. Econ. Sys. & Op. Res. 152; IE 201, 214, 240, 261*, 262*, 263*, 265*; Mech. Engr. 103D, 217A.

MATERIALS SCIENCE AND ENGINEERING (MSE)

Mathematics: 21 units minimum (See Note 1)
Science: 20 units minimum (See Note 2)

Engineering Fundamentals:
- five courses (See Note 2)

Technology in Society: one course (See Note 4)

Engineering Depth:
- MSE 151. Structural Materials Engineering 3
- MSE 152. Electronic Materials Engineering 3
- MSE 161. Materials Science Lab I 3
- MSE 162. Materials Science Lab II 2
- MSE 163. Materials Science Lab III 2
- Materials Science Fundamentals* 24

Science and Engineering Options† 9

Total 46

* MSE Fundamentals: 24 units from MSE 191, 192, 193, 194, 195, 196, 197, 198, 199
† MSE Options: 9 units from one of the following six areas:
- Chemistry (Chem. 151, 153, 171, 173, 175)
- Chemical Engineering (Chem. Engr. 110, 130, 140, 150, 170; Engr. 20; Mech. Engr. 33)
- Electrical Engineering (Elect. Engr. 101, 102, 111, 112, 113, 141, 142; Engr. 40)
- Mechanical Engineering (Engr. 14, 15; Mech. Engr. 103, 111, 151A, 131B, 161)
- Physics (Phys. 110, 111, 120, 121, 122, 130, 131, 132, 170, 171, 172)
- Self-Defined Option (petition for a self-defined cohesive program, minimum of 9 units)

MECHANICAL ENGINEERING (ME)

Mathematics: 24 units minimum *(See Note 1)
Science: 18 units minimum *(See Note 2)

Engineering Fundamentals:
- five courses† (See Note 3)

Technology in Society: one course (See Note 4)

Engineering Depth:
- ME 33. Introductory Fluids Engineering 4
- ME 103D. Engineering Drawing 1
- ME 101. Visual Thinking 3
- ME 103. Manufacturing Technology 4
- ME 111. Stress, Strain, and Strength 3
- ME 112. Mechanical Systems Design (students must sign up for all three modules concurrently)
  - ME 112A. 1
  - ME 112B. 2
  - ME 112C. 1
- ME 113. Engineering Design 3
- ME 131A. Heat Transfer 5
- ME 131B. Fluid Mechanics 3
- ME 132. Thermosciences Laboratory 3
  or ME 130. Internal Combustion Engines
- ME 161. Mechanical Vibrations 4

Total 45

Options to complete the ME Depth sequence (pick two items below):
- Engr. 105A. Control Systems 3
- ME 117. Introduction to Sensors 3
ME 118. Introduction to Mechatronics 4
ME 131C. Thermodynamics 3

* Math. and science must total 45 units. Math. : 24 units required and must include a course in differential equations (e.g., ME 100). Science: 18 units minimum and must include chemistry and physics, with at least one year's study in one of them.
† Engr. 15, 30, 40, 70 are required.

PETROLEUM ENGINEERING

Petroleum Engineering is offered by the School of Earth Sciences. Consult the “Petroleum Engineering” section of this bulletin for requirements.

School of Engineering majors who anticipate summer jobs or career positions associated with the oil industry may wish to consider enrolling in Engineering 120, Fundamentals of Petroleum Engineering.

SCHOOL OF ENGINEERING MAJORS

The School of Engineering offers the degree of Bachelor of Science in Engineering. School of Engineering programs must be approved by the Undergraduate Council of the school. There are two types of programs: majors that have been proposed by cognizant faculty groups and have been preapproved by the council, and Individually Designed Majors. At present, there are three preapproved majors: Aeronautics and Astronautics, Computer Systems Engineering, and Product Design. Total units required for these majors must be at least 90 and not more than 107. These majors are not accredited by ABET.

AERONAUTICS AND ASTRONAUTICS (AA)

Mathematics: (21 units)
Math. 53 or 130 or Mech. Engr. 100. 3-5
Differential Equations (See Note 1)
Math electives
Science: (18 units)
Physics 41. Mechanics 3
Physics 43 or 23. Electricity 3
One further physics course 3
Science electives (see note 2) 9
Engineering Fundamentals: (five courses)
Engr. 30. Engineering Thermodynamics 3
Engr. 70A. or 70X. Programming 5
Engr. 15. Dynamics 5
Two Fundamental courses (See Note 3)
Technology in Society: (3-5 units)
One course (See Note 4)
Engineering Depth: (39 units)
AA 100. Introduction to Aeronautics and Astronautics 3
Civil & Envir. Engr. 180A. Introduction to Structural Analysis 3
Mech. Engr. 111. Stress, Strain, and Strength 3
Engr. 104. Dynamic Behavior 3
Mech. Engr. 33. Introduction to Fluids 4
Engineering
Mech. Engr. 131A. Heat Transfer 5
Mech. Engr. 131B. Fluid Mechanics 3
Depth Area I* 6
Depth Area II* 6
Engineering Electives (two) † 6
Total .................................................. 100-106

* Depth Areas; four courses, two each from two of the following areas:
- Fluids (AA 200A, 210A, 214A, 280 or 283; Mech. Engr. 131C)
- Structures (AA 240A, 240B, 256)
- Dynamics and Controls (Engr. 105; AA 242, 271A, 279)
- Systems Design (AA 241A, 241B, 236A, 236B)
† Electives to be approved by the adviser; might be from the Depth area lists, or courses such as AA 201A, 210B, 252; Engr. 206, 209; or other upper-division engineering courses.

COMPUTER SYSTEMS ENGINEERING (CSE)

Mathematics: (23 units)
Math. 41, 42, 51. Calculus 15
Math 52 or 53. Multivar Math 5
Math. 103 or 113. Linear Algebra* 3
Science: (13 units)
Phys. 41. Mechanics 3
Phys. 43. Electricity 3
Phys. 45. Magnetism 3
Phys. 47. Light and Heat 4
Engineering Fundamentals: (10 units)
Engr. 40. Electronics 5
Engr. 70X. Programming Methodology and Abstractions (or Comp. Sci. 106A and B) 5
Technology in Society: (3-5 units)
one course † (See Note 4)
Depth: (55 units)
Comp. Sci. 107. Programming Paradigms 5
Comp. Sci. 108. Object-Oriented Systems Design 4
Comp. Sci. 109. Introduction to Computer Science 4
Comp. Sci. 143. Compilers or Comp. Sci. 240A. Operating Systems 4
Comp. Sci. 150 Introduction to Computer Theory for non-Computer Science Majors 4
Elect. Engr. 101. Circuits 4
Elect. Engr. 111, 112. Electronics 8
Elect. Engr. 121. Digital Design Laboratory 3
Elect. Engr. 182. Computer Organization 4
Elect. Engr. 183. Advanced Logic Laboratory 3
Elect. Engr. 271. Introduction to VLSI Systems 3
Electives** 6
Senior Project (Comp. Sci. 191, 194, or 195B) †† 3
Total .................................................. 102-104

* Completion of Math. 52 and 53 will satisfy the Math. 103/113 requirement.
† Comp. Sci. 201 also fulfills this requirement.
Programs must comply with the following requirements. Undergraduate Council detailing their programs. The degree is designated Bachelor of Science in Engineering. Most students include the study of physics and chemistry in their programs. To meet ABET accreditation criteria, a student's program must include the study of physics and chemistry in their programs. The proposal statement should be followed by a list of courses to be counted toward the major; normally the courses selected should represent a well-coordinated sequence that provides mastery of the important principles and techniques in a well-defined field. In some circumstances, especially if the proposal indicates that the goal of the major is to prepare the student for graduate work outside of engineering, a more general engineering program may be appropriate. The proposal must be signed by two faculty members whose signatures certify that they endorse the major as described in the proposal and agree to serve as the student's permanent advisers. One of the faculty members, who must be from the School of Engineering, acts as primary advisor, and the proposal must be accompanied by a statement from that person giving his or her appraisal of the academic viability of the proposed major. Students proposing IDMs must have at least three quarters of undergraduate work remaining at Stanford after their proposals are submitted. Any changes in a previously approved major must be endorsed by the faculty advisers and reapproved by the Undergraduate Council. Proposals are reviewed and acted upon once per quarter. Proposals should be submitted to the Senior Associate Dean for Student Affairs, Terman 208.

**INDIVIDUALLY DESIGNED MAJORS (IDMs)**

IDMs are intended for undergraduates interested in pursuing engineering programs that fall outside the purview of department majors or the preapproved School of Engineering majors. Programs are designed by students with the assistance of two faculty advisers of their choice and are presented to the Undergraduate Council for approval. The degree is designated Bachelor of Science in Engineering: (approved title).

Students must submit written proposals to the Undergraduate Council detailing their programs. Programs must comply with the following requirements: mathematics (21 units minimum, see Note 1 below), science (17 units minimum, see Note 2), Technology in Science (one course, see Note 4), engineering courses (40 units minimum), and additional courses to bring the total to at least 90 and not more than 107 units. (Students may take additional courses beyond the 107 units, but the IDM proposal must be limited to a maximum of 107 units.) Each proposal should begin with a statement that describes the major, articulates the motivation for and the justification and ultimate goal of the major, and shows how the courses listed relate to and fulfill the major's goal. A proposed title for the major, to be included on the official University transcript, should be included.

The proposal statement should be followed by a list of courses to be counted toward the major; normally the courses selected should represent a well-coordinated sequence that provides mastery of the important principles and techniques in a well-defined field. In some circumstances, especially if the proposal indicates that the goal of the major is to prepare the student for graduate work outside of engineering, a more general engineering program may be appropriate. The proposal must be signed by two faculty members whose signatures certify that they endorse the major as described in the proposal and agree to serve as the student's permanent advisers. One of the faculty members, who must be from the School of Engineering, acts as primary advisor, and the proposal must be accompanied by a statement from that person giving his or her appraisal of the academic viability of the proposed major. Students proposing IDMs must have at least three quarters of undergraduate work remaining at Stanford after their proposals are submitted. Any changes in a previously approved major must be endorsed by the faculty advisers and reapproved by the Undergraduate Council. Proposals are reviewed and acted upon once per quarter. Proposals should be submitted to the Senior Associate Dean for Student Affairs, Terman 208.

Note 1 (Mathematics)—Engineering students need a solid foundation in the calculus of continuous functions including differential equations, an introduction to discrete mathematics, and an understanding of statistics and probability theory. The minimum preparation should normally include calculus to the level of Math. 43. Knowledge of ordinary differential equations and matrices is important in many areas of engineering, and students are encouraged to select additional courses in these topics. To meet ABET accreditation criteria, a student's program must include the study of differential equations.

Courses that satisfy the mathematics requirement are listed in the Handbook for Undergraduate Engineering Programs.

Note 2 (Science)—A strong background in the basic concepts and principles of natural science in such fields as physics, chemistry, geology, and biology is essential for engineering. Most students include the study of physics and chemistry in their programs. To meet ABET accreditation criteria, a student's program
must include study of both chemistry and physics, with at least one year's study in one of them.

Courses that satisfy the science requirement are listed in the Handbook for Undergraduate Engineering Programs.

Note 3 (Engineering Fundamentals)—The Engineering Fundamentals requirement is satisfied by a nucleus of technically rigorous introductory courses chosen from the various engineering disciplines. It is intended to serve several purposes. First, it provides students with a breadth of knowledge concerning the major fields of endeavor within engineering. Second, it allows the incoming engineering student an opportunity to explore a number of courses before embarking on a specific academic major. Third, the individual classes each offer a reasonably deep insight into a contemporary technological subject for the interested non-engineer.

The requirement is met by taking five courses from the following list:

- Engr. 20. Introduction to Chemical Engineering
- Engr. 30. Engineering Thermodynamics
- Engr. 40. Introductory Electronics*
- Fnr. 50. Introductory Science of Materials*
- Engr. 60. Engineering Economics or Engr. 62. Introduction to Optimization
- Engr. 70A or 70X. Introduction to Software Engineering

* Engr. 40 and 50 may be taken on video at some of Stanford's Overseas Centers.

Note 4 (Technology in Society)—It is important to obtain a broad understanding of engineering as a social enterprise. To introduce this aspect of intellectual and professional development, all engineering majors require one course on the interaction of technology with values and beliefs, social institutions, or behavior.

Courses preapproved for this requirement are listed in the Handbook for Undergraduate Engineering Programs.

MINORS

An undergraduate minor in Engineering may be pursued by interested students in many of the school's departments; consult with a department's Undergraduate Program representative, or the Office of Student Affairs, Terman Engineering Center, room 208. General requirements and policies for a minor in the School of Engineering are: (1) a set of courses totaling not less than 18 and not more than 36 units, with a minimum of six courses of at least 3 units each; (2) the set of courses should be sufficiently coherent as to present a body of knowledge within a discipline or subdiscipline; (3) prerequisite mathematics, statistics, or science courses, such as those normally used to satisfy the school's requirements for a department major, may not be used to satisfy the requirements of the minor; conversely, engineering courses that serve as prerequisites for subsequent courses must be included in the unit total of the minor program; (4) departmentally based minor programs are structured at the discretion of the sponsoring department, subject only to requirements (1), (2), and (3) above. Interdisciplinary minor programs may be submitted to the Undergraduate Council for approval and sponsorship. A "General Engineering" minor is not offered.

AERONAUTICS AND ASTRONAUTICS (AA)

The Aero/Astro minor introduces undergraduates to the key elements of modern aerospace systems and their many spinoff technologies. Within the minor, students may focus on aircraft, spacecraft, or disciplines relevant to both. The course requirements for the minor are described in detail below. Courses cannot be double-counted within a major and a minor, or within multiple minors; if necessary, the Aero/Astro adviser can help select substitute courses to fulfill the AA minor core.

The following courses fulfill the minor requirements.

**CORE**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA 100. Introduction to Aeronautics and Astronautics</td>
<td>3</td>
</tr>
<tr>
<td>Engr. 15. Dynamics*</td>
<td>5</td>
</tr>
<tr>
<td>Engr. 30. Thermodynamics*</td>
<td>3</td>
</tr>
<tr>
<td>Mech. Engr. 33. Introductory Fluids</td>
<td>4</td>
</tr>
<tr>
<td>Mech. Engr. 131A. Heat Transfer</td>
<td>5</td>
</tr>
<tr>
<td><strong>Core Total</strong></td>
<td>12-25</td>
</tr>
</tbody>
</table>

**ELECTIVES AREAS**

Upper-division electives are:

- Two courses from one of the elective areas below | 6 |
- One course from a second area | 3 |
- **Program Total** | 21-34 |

**Fluids:**

- AA 200A. Applied Aerodynamics | 3 |
- AA 210A. Fund of Compressible Flow | 3 |
- AA 214A. Numerical Methods in Fluid Mechanics | 3 |
- AA 280. Rocket Propulsion or AA 283. Aircraft Propulsion | 3 |

**Structures:**

- AA 240A. Analysis of Structures | 3 |
- AA 240B. Analysis of Structure - II | 3 |
- AA 256. Mechanics of Composites | 3 |

**Dynamics and Controls:**

- AA 242. Classical Dynamics | 3 |
- AA 271. Dynamics and Control of Spacecraft/Aircraft | 3 |
- AA 279. Space Mechanics | 3 |
- Engr. 105. Feedback Control Design | 3 |

**Aerospace Systems Synthesis/Design:**

- AA 236A,B. Spacecraft Design | 6 |
- AA 241A,B. Aircraft Design | 6 |

* Engr. 14, 15, or 30 are waived as minor requirements if already taken as part of the major.
CHEMICAL ENGINEERING (ChE)

The following courses fulfill the minor requirements.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ChE 100</td>
<td>Chemical Process Modeling</td>
<td>3</td>
</tr>
<tr>
<td>ChE 110</td>
<td>Equilibrium Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>ChE 130</td>
<td>Kinetics and Reactor Design</td>
<td>3</td>
</tr>
<tr>
<td>ChE 140</td>
<td>Fluid Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>ChE 150</td>
<td>Energy and Mass Transport</td>
<td>4</td>
</tr>
<tr>
<td>ChE 160</td>
<td>Chemical Engineering Plant Design</td>
<td>3</td>
</tr>
<tr>
<td>ChE 170</td>
<td>Polymer Science and Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ChE 180A</td>
<td>Chemical Engineering Lab</td>
<td>3</td>
</tr>
<tr>
<td>ChE 180B</td>
<td>Chemical Engineering Lab</td>
<td>3</td>
</tr>
<tr>
<td>Chem. 171</td>
<td>Physical Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>Engr. 20</td>
<td>Introduction to Chemical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>35</td>
</tr>
</tbody>
</table>

CIVIL AND ENVIRONMENTAL ENGINEERING (CEE)

The Civil and Environmental Engineering minor is intended to give students an in-depth introduction to one or more areas of civil engineering. Departmental expertise and undergraduate course offerings are available in the areas of Environmental Water Studies, Construction Engineering and Management, and Structural Engineering. The necessary prerequisites for a civil and environmental engineering minor are Physics 41 and Math. 41, 42, and 43. Students should recognize that a minor in Civil and Environmental Engineering is not an ABET-accredited degree program.

Since civil engineering is a very broad field and undergraduates having widely varying backgrounds may be interested in obtaining a civil and environmental engineering minor, no single set of course requirements is appropriate for all students. Instead, interested students are encouraged to propose their own set of courses within the guidelines listed below; this list must be officially approved by the civil and environmental engineering undergraduate minor adviser. Additional information on preparing a minor program, including “example” programs focusing on each of the areas of expertise listed above is available in the Department of Civil and Environmental Engineering office (Terman M-42). While each example program focuses on a different area of expertise within the department, other combinations of courses are also possible.

General guidelines are:

1. A CEE minor must contain at least 24 units of course work not taken for the major, and must consist of at least six classes.
2. The list of courses must represent a coherent body of knowledge in a focused area, and should include classes that build upon one another.
3. Professor Street (Terman M-17; x3-4969; e-mail: street@ce) is the CEE undergraduate minor adviser, and provides guidance and advice. Students must consult with Professor Street in developing their minor program, and obtain approval of the finalized study list from him.

COMPUTER SCIENCE (CS)

The following courses fulfill the minor requirements. Prerequisites include the standard mathematics sequence through Math. 51.

INTRODUCTORY PROGRAMMING

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 106A/B</td>
<td>Programming Method/Abstractions</td>
<td>10</td>
</tr>
<tr>
<td>or CS 106X</td>
<td>Programming Method/Abstractions (Accelerated)</td>
<td>5</td>
</tr>
</tbody>
</table>

(AP Credit may be used to fulfill this requirement)

CORE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 107</td>
<td>Programming Paradigms</td>
<td>5</td>
</tr>
<tr>
<td>CS 108</td>
<td>Object-Oriented Systems Design</td>
<td>4</td>
</tr>
<tr>
<td>CS 109</td>
<td>Introduction to Computer Science</td>
<td>4</td>
</tr>
<tr>
<td>CS 150</td>
<td>Introduction to Computer Theory for Non-CS Majors</td>
<td>4</td>
</tr>
</tbody>
</table>

ELECTIVES

Select two courses from different areas.

Systems:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 143</td>
<td>Compilers</td>
<td>4</td>
</tr>
<tr>
<td>CS 145</td>
<td>Databases</td>
<td>4</td>
</tr>
<tr>
<td>CS 148</td>
<td>Graphics</td>
<td>3</td>
</tr>
<tr>
<td>CS 240A</td>
<td>Operating Systems</td>
<td>4</td>
</tr>
</tbody>
</table>

Theory:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 154</td>
<td>Automata and Complexity Theory</td>
<td>4</td>
</tr>
<tr>
<td>CS 157</td>
<td>Logic and Automated Reasoning</td>
<td>4</td>
</tr>
<tr>
<td>CS 161</td>
<td>Data Structures and Algorithms</td>
<td>4</td>
</tr>
</tbody>
</table>

Artificial Intelligence:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 121</td>
<td>Introduction to Artificial Intelligence</td>
<td>3</td>
</tr>
<tr>
<td>CS 221</td>
<td>AI: Principles and Techniques</td>
<td>3</td>
</tr>
</tbody>
</table>

Numerical Computing:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 137</td>
<td>Introduction to Scientific Computing</td>
<td>4</td>
</tr>
<tr>
<td>CS 147</td>
<td>Introduction to Human-Computer Interaction Design</td>
<td>3-4</td>
</tr>
</tbody>
</table>

Note: for students with no programming background and who begin with CS 106A, the minor consists of eight courses.

ELECTRICAL ENGINEERING (EE)

Courses fulfilling the minor are from any of the following three tracks.

Option I:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engr. 40</td>
<td>Introductory Electronics</td>
<td>5</td>
</tr>
<tr>
<td>EE 101</td>
<td>Circuits and Systems I</td>
<td>4</td>
</tr>
<tr>
<td>EE 102</td>
<td>Circuits and Systems II</td>
<td>4</td>
</tr>
<tr>
<td>EE 103</td>
<td>Introduction to Signal Processing</td>
<td>3</td>
</tr>
</tbody>
</table>

Four graded EE courses of level 100 or higher

Option II:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engr. 40</td>
<td>Introductory Electronics</td>
<td>5</td>
</tr>
<tr>
<td>EE 101</td>
<td>Circuits and Systems I</td>
<td>4</td>
</tr>
<tr>
<td>EE 111</td>
<td>Electronics I</td>
<td>4</td>
</tr>
<tr>
<td>EE 112</td>
<td>Electronics II</td>
<td>4</td>
</tr>
</tbody>
</table>

Four graded EE courses of level 100 or higher

Option III:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engr. 40</td>
<td>Introductory Electronics</td>
<td>5</td>
</tr>
<tr>
<td>EE 121</td>
<td>Digital Design Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>EE 181</td>
<td>Introduction to Computer Systems and Assembly Language Programming (enroll in CS110)</td>
<td>4</td>
</tr>
<tr>
<td>EE 182</td>
<td>Computer Organization and Design</td>
<td>4</td>
</tr>
</tbody>
</table>

Four graded EE courses of level 100 or higher
INDUSTRIAL ENGINEERING (IE)

The following courses fulfill the minor requirements.

Background requirements:
- Math. 43
- Probability
- Statistical Methods

Minor requirements:
- Engr. 62. Introduction to Optimization 4
- Engr. 60. Engineering Economy (prerequisite: Math. 41) 3
- IE 100. Organizational Behavior 4
- IE 121. Quality Assurance and Control (prerequisite: probability and statistical methods) 4
- IE 133. Industrial Accounting 4
- IE 260. Analysis of Production and Operational Systems (prerequisite: probability and Engr. 62) 4

MATERIALS SCIENCE AND ENGINEERING (MSE)

A minor in the Department of Materials Science and Engineering allows interested students to explore the role of materials in modern technology and to gain understanding of the fundamental processes that govern materials behavior.

The following courses fulfill the minor requirements.

Fundamentals:
- Engr. 50. Introductory Science of Materials 4
- MSE 151. Microstructure and Mechanical Properties 3
- MSE 152. Electronic Materials Engineering 3

Electives: four courses from the MSE Core (16 units)
- MSE 191. Mathematical and Computational Methods in Materials Science 4
- MSE 192. Solid State Thermodynamics 4
- MSE 193. Atomic Arrangements in Solids 4
- MSE 194. Phase Equilibria 4
- MSE 195. Waves and Diffraction in Solids 4
- MSE 196. Imperfections in Crystalline Solids 4
- MSE 197. Rate Processes in Materials 4
- MSE 198. Mechanical Properties of Materials 4
- MSE 199. Electrical and Magnetic Properties of Solids 4

MECHANICAL ENGINEERING (ME)

The following courses fulfill the minor requirements.

GENERAL MINOR

This minor option aims to expose students to the breadth of ME in terms of topics and in terms of analytic and design activities. The minor consists of seven courses totaling 26 to 28 units. It meets the requirements put forth by the University (six course minimum, 18 to 36 units). Prerequisites are Math. 41, 42; Physics 41.

- Engr. 15. Dynamics 4
- Engr. 30. Engineering of Thermodynamics 3
- ME 33. Introductory Fluids Engineering 4
- ME 101. Visual Thinking 3

Plus two of the following:
- ME 103. Manufacturing and Design 4
- ME 111. Stress, Strain, and Strength 3
- ME 131A. Heat Transfer 5
- ME 161. Dynamic Systems 4

THERMOSCIENCES

This proposed minor consists of seven courses totaling 26 units. It meets the requirements put forth by the University (six course minimum, 18 to 36 units). Prerequisites are Math. 41, 42, 43; Physics 41.

- Engr. 30. Engineering Thermodynamics 3
- ME 33. Introductory Fluids Engineering 4
- ME 130. Internal Combustion Engines 3
- or ME 132. Thermosciences Lab
- ME 131A. Heat Transfer 5
- ME 131B. Fluid Mechanics 3
- ME 131C. Thermodynamics 3

MECHANICAL DESIGN

This minor option aims to expose students to design activities, supported by analysis. This proposed minor consists of seven courses totaling 24 to 26 units. It meets the requirements put forth by the University (six course minimum, 18 to 36 units). Prerequisites are Math. 41, 42; Physics 41.

- Engr. 15. Dynamics 4
- ME 111. Stress, Strain, Strength 3
- ME 112. Mechanical Systems 4

Plus two of the following:
- ME 99. Mechanical Dissection 3
- ME 101. Visual Thinking 3
- ME 103. Manufacturing and Design 4

Plus one of the following:
- ME 113. Engineering Design 3
- ME 117. Introduction to Sensors 3
- ME 118. Introduction to Mechatronics 4

PROGRAMS IN MANUFACTURING

Programs in manufacturing are available at the undergraduate, M.S., and Ph.D. levels. The undergraduate programs of the departments of Civil and Environmental Engineering, Industrial Engineering and Engineering Management, and Mechanical Engineering provide general preparation for any student interested in manufacturing. More specific interests can be accommodated through Individually Designed Majors (IDMs).
BACHELOR OF ARTS
AND SCIENCE (B.A.S.)

This degree is available to students who complete both the requirements for a B.S. degree in engineering and the requirements for a major or program ordinarily leading to the A.B. degree. For more information, see the "Graduate Degrees" section of this bulletin.

DUAL AND COTERMINAL DEGREE PROGRAMS

A Stanford undergraduate may work simultaneously toward two bachelor’s degrees or toward a bachelor’s and a master’s degree, that is, A.B. and M.S., A.B. and A.M., B.S. and M.S., or B.S. and A.M. The degrees may be granted simultaneously or at the conclusion of different quarters. Usually five years are needed for a combined program.

Dual A.B. and B.S. Degree Program—To qualify for both degrees, a student must (1) complete the stated University and department requirements for each degree, (2) complete 15 full-time quarters, or three full-time quarters after completing 180 units, and (3) complete a total of 225 units (180 units for the first bachelor’s degree plus 45 units for the second bachelor’s degree).

Coterminal Bachelor’s and Master’s Degree Program—A Stanford undergraduate may be admitted to graduate study for the purpose of working simultaneously toward a bachelor’s degree and a master’s degree. To qualify for both degrees, a student must (1) complete three full-time quarters (or the equivalent) after completing 180 units, (2) complete, in addition to the 180 units required for the bachelor’s degree, the number of units required by the graduate department for the master’s degree (not fewer than the University minimum of 36 units), (3) complete the requirements for the bachelor’s degree (department, school, and University) and apply for the degree at the appropriate time at the Office of the Registrar, and (4) complete the department and University requirements for the master’s degree and apply for the degree at the Degree Progress Section of the Registrar’s Office.

Admission to the coterminal program requires admission to graduate status by the pertinent department. Admission criteria vary from department to department.

Procedure for Applying for Admission to Coterminus Degree Programs—A Stanford undergraduate may apply (using the University coterminal application form) for admission to the coterminal bachelor’s and master’s degree program after the beginning of the eighth quarter of undergraduate work and no later than the end of the 11th quarter of undergraduate work, and at least four quarters in advance of the anticipated date of conferral of the master’s degree. Students seeking a graduate degree in engineering must apply to the pertinent department.

GRADUATE ADMISSION

Application for admission with graduate standing in the school should be made to the department’s graduate admissions committee. While most graduate students have undergraduate preparation in an engineering curriculum, it is feasible to enter from other programs, including chemistry, geology, mathematics, or physics.

THE HONORS COOPERATIVE PROGRAM

A number of industrial firms, government laboratories, and other organizations participate in the Honors Cooperative Program (HCP), a program that permits qualified professional employees of member companies to register for Stanford courses and obtain a graduate degree on a part-time basis.

The courses are offered by the School of Engineering on campus or through the Stanford Instructional Television Network (SITN). SITN broadcasts approximately 200 courses a year over a five-channel system to 250 corporate sites in the San Francisco and Silicon Valley area. This program enables students to receive live courses and interact by means of a telephone talkback system from their corporate location. Students outside the local broadcast range may pursue their graduate degree by participating in SITN’s Tutored Videotape Instruction (TVI) Program. SITN offers additional programs to member companies such as Non-Credit Option (NCO), Audit Option, several certificate programs, short courses, and course licensing. For a full description of educational services provided by SITN, telephone (650) 725-3000; fax (650) 725-2868; write 401 Durand Bldg., Stanford, CA 94305-4036; or send electronic mail to na.itv@forsythe.stanford.edu.

REGISTRATION

New graduate students should follow procedures for registration as listed in the University’s quarterly Time Schedule. Adviser assignments can be obtained from department offices.

GRADUATE CURRICULA

For further details about the following programs, see the department sections in this bulletin.

Related aspects of particular areas of graduate study are commonly covered in the offerings of several departments and divisions. Graduate students are encouraged, with the approval of their department advisers, to select courses in departments other than their own to achieve a broader appreciation of their field of study. For example, most departments in the school offer courses
concerned with properties of materials, and a student interested in an aspect of materials engineering can often gain appreciable benefit from the related courses given by departments other than her or his own.

Departments and divisions of the school offer graduate curricula as follows.

**AERONAUTICS AND ASTRONAUTICS**

The current research and teaching activities cover a number of advanced fields, with special emphasis on:

- Active Noise Control
- Aerodynamic Noise
- Aeroelasticity
- Aircraft Design, Performance, and Control
- Applied Aerodynamics
- Biomedical Mechanics
- Computational Aero-Acoustics
- Computational Fluid Dynamics
- Control of Robots, including Space and Deep-Underwater Robots
- Conventional and Composite Structures/Materials Systems Optimization
- Direct and Large Eddy Simulation of Turbulence
- High-Lift Aerodynamics
- Hypersonic and Supersonic Flow
- Inertial Instruments
- Multidisciplinary Design Optimization
- Navigation Systems (especially GPS)
- Optical Diagnostics in Fluid Dynamics
- Optimal Control, Estimation, System Identification
- Physical Gas Dynamics
- Robust Control of Flexible Spacecraft
- Spacecraft Design and Satellite Engineering
- Shock Tube Studies of Vortex Interactions
- Turbulent Flow and Combustion

**CHEMICAL ENGINEERING**

- Applied Statistical Mechanics
- Biocatalysis
- Biochemical Engineering and Biophysics
- Computational Materials Science
- Colloid Science
- Dynamics of Complex Fluids
- Hydrodynamic Stability
- Kinetics and Catalysis
- Newtonian and Non-Newtonian Fluid Mechanics
- Polymer Physics
- Surface and Interface Science

**CIVIL AND ENVIRONMENTAL ENGINEERING**

- Construction Engineering and Management
- Environmental and Water Studies
- Environmental Engineering and Science

**COMPUTER SCIENCE**

- Analysis of Algorithms
- Artificial Intelligence
- Asynchronous Systems
- Automated Deduction
- Autonomous Agents
- Combinatorial Mathematics
- Complexity Theory
- Computational Geometry
- Computer Architecture
- Computer Graphics
- Computer Vision
- Database Systems
- Design Automation
- Distributed and Parallel Computation
- Human-Computer Interaction
- Information Management
- Knowledge-Based and Expert Systems
- Knowledge Representation and Logic
- Mathematical Theory of Computation
- Networks and Distributed Systems
- Operating Systems
- Programming Systems/Languages
- Robotics
- Scientific Computing and Numerical Analysis

**ELECTRICAL ENGINEERING**

- Computer Hardware
- Computer Software Systems
- Control and Systems Engineering
- Communication Systems
- Electronic Circuits
- Electronic Devices, Sensors, and Technology
- Fields, Waves, and Radioscience
- Lasers, Optoelectronics, and Quantum Electronics
- Network Systems
- Image Systems
- Signal Processing
- Solid State Materials and Devices
- VLSI Design

**ENGINEERING**

- Interdepartmental Programs
- Interdisciplinary Programs

**ENGINEERING IN BIOLOGY AND MEDICINE**

- Biostatistics
- Design for Medical Applications
- Information Processing in and for Biomedical Systems
- Mechanics of Hearing
- Medical Imaging
- Neuromuscular Biomechanics
Orthopedic Biomechanics
Rehabilitation Engineering
Transport Phenomena in Biological Systems

ENGINEERING-ECONOMIC SYSTEMS AND OPERATIONS RESEARCH
Business and Technology
Complementarity Problems and Equilibrium Programming
Decision Analysis
Dynamic Programming
Energy, Natural Resources, and the Environment
Intelligent Systems
Inventory Management
Investment
Lattice Programming
Management of Projects
Medical Policy
National Security Policy
Network Optimization, Design, and Equilibria
Numerical Optimization
Organizational Analysis
Performance Evaluation
Simulation Methodology
Stochastic Optimization
Stochastic Modeling and Queueing Analysis
Systems Economics
Telecommunications and Information Policy
Transportation Systems
Underground Mining

INDUSTRIAL ENGINEERING AND ENGINEERING MANAGEMENT
Financial Decisions
Inventory Control
Manufacturing Systems
Organizational Design and Control
Production and Operating Systems
Quality Assurance
Risk Analysis
Technology Management

MATERIALS SCIENCE AND ENGINEERING
Biomaterials
Ceramics and Composites
Computational Materials Science
Design/Manufacturing
Electrical and Optical Behavior of Solids
Electron Microscopy
Fracture and Fatigue
Imperfections in Crystals
Kinetics
Magnetic Behavior of Solids
Magnetic Storage Materials
Phase Transformations
Physical Metallurgy
Solid State Chemistry
Structural Analysis

Thermodynamics
Thin Films
X-Ray Diffraction

MECHANICAL ENGINEERING
Biomechanics
Combustion Science
Computational Mechanics
Controls
Design of Mechanical Systems
Dynamics
Environmental Science
Experimental Stress and Analysis
Fatigue and Fracture Mechanics
Finite Element Analysis
Fluid Mechanics
Heat Transfer
High Temperature Gasdynamics
Kinematics
Manufacturing
Mechatronics
Product Design
Robotics
 Sensors
Solids
Thermodynamics
Turbulence

SCIENTIFIC COMPUTING AND COMPUTATIONAL MATHEMATICS
See the “Scientific Computing and Computational Mathematics” section of this bulletin.

SPACE SCIENCE
See the “Center for Space Science and Astrophysics” section of this bulletin.

ENGINEERING IN BIOLOGY AND MEDICINE
Stanford does not have a formal department of bioengineering; however, there are several faculty in the School of Engineering whose primary research activities are in this general area. There are many opportunities in the medical and biological sciences for collaboration. Individually designed B.S. majors in bioengineering can be arranged. The faculty working in bioengineering are in various departments of the School of Engineering; a list of their names, together with a summary of their research interests, is available from the committee chair.

Students interested in pursuing graduate study in bioengineering apply for admission and financial aid to the appropriate department on the grounds of their previous training and future interests. Their applications are judged on substantially the same ground as other applicants to the department.
In addition to the standard engineering department degrees, the degree of MSE: Biomechanical Engineering is offered. Details on this program and subsequent Ph.D. studies can be obtained from the Biomechanical Engineering Division, Department of Mechanical Engineering.

The research being conducted in the field of bioengineering within the various departments reflects the technological emphasis of those departments. For instance, research on immobilized microbial cell function and physiology in compact bioreactors, protein absorption from sheared suspensions onto polymer films, protein conformation at fluid/polymer interfaces, and factors that influence growth and product formation in genetically engineered mammalian cells is pursued in the Department of Chemical Engineering. Faculty in Mechanical Engineering are doing research on aids for the disabled, bone mechanics, the mechanics of hearing, neuromuscular dynamics, orthopedic biomechanics, and rehabilitation engineering. Cardiovascular dynamics and hemodynamics are being studied in Computer Science. In Electrical Engineering, advanced analysis techniques are applied to signal processing EKG, EEG, and x-ray image. Many research projects are carried out in collaboration with faculty of the Medical School or members of the local medical community.

Both the master's and the Ph.D. degree are ordinarily awarded by a particular department, and the candidate must meet the degree requirements of that department. The student's adviser assists in constructing a program of study incorporating appropriate courses in biology and medicine that also satisfies the degree requirements of the department in which the student is registered.

A student wishing to earn the M.S. in Engineering while pursuing the M.D. degree must apply separately for admission to the M.D. program and an engineering department. If the student is admitted to both, each school will encourage his or her pursuit of the other degree.

In addition to the financial support available through the departments in the form of fellowships, research assistantships, and teaching assistantships, there are externally administered fellowship programs for the support of graduate study in health-related fields. In particular, both the National Institute of Health and the National Science Foundation offer such fellowships based on national competition.

MANUFACTURING

Programs in manufacturing are available at the undergraduate, master's, and Ph.D. level. Master's programs are offered by the departments of Civil and Environmental Engineering, Industrial Engineering and Engineering Management (IEEM), and Mechanical Engineering. The Manufacturing Systems Engineering (MSE) program is jointly offered by IEEM and Mechanical Engineering. The M.B.A./MSE Dual Degree program is offered by the School of Engineering and Graduate School of Business in partnership. The Construction Engineering and Management program, offered by the Department of Civil and Environmental Engineering, is also a "manufacturing" program for students interested in facility and public works manufacturing. All of these programs take advantage of modern computer technology.

Doctoral programs related to manufacturing are available in a number of departments and involve research projects ranging from machine tool design to the integration of databases into production software.

The Future Professors of Manufacturing (FPM) program prepares graduates for university faculty careers with an emphasis on manufacturing. Candidates are first admitted to a Ph.D. program in a department of the School of Engineering or the Graduate School of Business, and then interested students may be nominated for the FPM program by the department.

For detailed information about the master's and Ph.D. programs, see the sections of this bulletin pertaining to industrial, mechanical, and civil and environmental engineering. For more information on the MSE program, contact the Design Division of Mechanical Engineering. For information on the M.B.A./MSE Dual Degree program and on the FPM Ph.D. program, contact Stanford Integrated Manufacturing Association (SIMA). Inquiries by email may be addressed to sima-info@sim.a.stanford.edu. For more information on manufacturing research and education in Engineering, browse the SIMA Web pages at http://www-sima.stanford.edu/ and the Web pages for departments.

GRADUATE PROGRAMS

MASTER OF SCIENCE

The M.S. degree is conferred on graduate students in engineering according to the University regulations stated in the "Graduate Degrees" section of this bulletin, and is described in the various department listings. A minimum of 45 units is usually required in M.S. programs in the School of Engineering. However, the presentation of a thesis is not a school requirement.

MASTER OF SCIENCE

IN ENGINEERING

The M.S. in Engineering is available to students who wish to follow an interdisciplinary program of study that does not conform to a normal graduate program in a department.

There are three school requirements for the M.S. degree in Engineering: (1) the student's program must be a coherent one with a well-defined objective and must be approved by a department
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within the school, (2) the student's program must include at least 21 units of courses within the School of Engineering with numbers 200 or above in which the student receives letter grades, (3) the program must include a total of at least 45 units. Each student's program is administered by the particular department in which it is lodged and must meet the standard of quality of that department.

Applications for admission should indicate the department in the school in which the student expects to take most of her or his courses. Transfer into this program is also possible from any program within the school by application to the appropriate department.

ENGINEER

The degree of Engineer is awarded at the completion of a comprehensive two-year program of graduate study. It is intended for students who desire more graduate training than can be obtained in an M.S. program. The program of study must satisfy the student’s department and usually includes 90 units beyond the B.S. degree, of which at least 60 must be devoted to advanced or graduate study in the major subject or closely related subjects. The presentation of a thesis is required. The University regulations for the Engineer degree are stated in the “Graduate Degrees” section of this bulletin, and further information is found in the individual departmental sections of this bulletin.

DOCTOR OF PHILOSOPHY

Programs leading to the Ph.D. degree are offered in each of the departments of the school. Special Ph.D. programs, which may be interdepartmental in nature (for example, Bioengineering), can be arranged. University regulations for the Ph.D. are given in the “Graduate Degrees” section of this bulletin. Further information is found in departmental listings.

FELLOWSHIPS AND ASSISTANTSHIPS

Departments and divisions of the School of Engineering award graduate fellowships, research assistantships, and teaching assistantships each year. Information and application forms may be obtained from the chair of the appropriate department or division.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

(AU) indicates that the course is subject to the University Activity Unit limitations (8 units maximum).

The “Engineering” courses deal with subject areas within engineering that are, in their essen-

tial nature, broader than the confines of any particular branch of engineering. These courses are taught by professors from several departments of the School of Engineering, under the supervision of those listed below.

Of the courses described in this section, many are of general interest to both engineering and nonengineering students. In addition, certain departmental courses are of general interest and without prerequisites.

Students interested in the interactions between technology and society should also consult the “Science, Technology, and Society” section of this bulletin.

PRIMARILY FOR UNDERGRADUATES

1. The Nature of Engineering—(Same as Science, Technology, and Society 51.) The engineering process and the people and organizations involved in engineering. Topics: some history; nature and source of engineering problems; interaction between engineering, science, mathematics, and business; the nature of the intellectual disciplines involved in engineering; and, specific aspects of the engineering process, e.g., design, development and test, production, research. Lectures, problem sets, design exercises, writing assignments, field trips. GER:2b (DR:6)

3 units, Aut (Freyberg)

14. Applied Mechanics: Statics and Deformables—Introduction to engineering mechanics (freebody diagrams, equilibrium, trusses, frames, cables, internal forces, shear and bending moment, stress and strain, Hooke’s law, Mohr’s circle, Poisson’s ratio, and torsion of circular sections). Alternates between concepts of statics and solid mechanics, explaining where static and elastic assumptions are valid, and emphasizing the modeling of physical systems and design of simple members and structures in two dimensions. Problem sessions. Prerequisite: Physics 41. GER:2b (DR:6)

5 units, Aut (Pinsky)

Win (Barnett)

Spr (Sheppard)

15. Dynamics—Application of Newton’s Laws to solve static and dynamic problems, particle and rigid body dynamics, freebody diagrams, writing equations of motion. 2-D and 3-D cases including gyroscopes, spacecraft, rotating machinery. Solution of equations of motion and dynamic response of simple mechanical systems. Problem sessions. Prerequisite: Math. 23 or 43, Physics 41. GER:2b (DR:6)

5 units, Aut (Powell)

20. Introduction to Chemical Engineering—Overview of chemical engineering through discussion and engineering analysis of physical and chemical processes. Topics: overall staged separations, ma-
terial and energy balance, concepts of rate processes, heat and mass transport, and kinetics of chemical reactions. Applications of these concepts to areas of current technological importance: biotechnology, production of chemicals, materials processing, and purification. Prerequisite: Chemistry 31.

3 units, Spr (Fuller)

30. Engineering Thermodynamics—Introduction to the concepts of energy and entropy from elementary considerations of the microscopic nature of matter. Use of basic thermodynamics concepts in the solution of engineering problems. Methods and problems in the socially responsible economic generation and utilization of energy in central power stations, solar systems, gas turbine engines, refrigeration devices, automobile engines, etc. Prerequisites: Math. 19, 20, 21 or 41, 42 and Physics 41 or equivalent. GER:2b (DR:6)

3 units, Aut, Win (Staff)

40. Introductory Electronics—Overview of electronic engineering. Electrical quantities, and their measurement including the operation of the oscilloscope. Digital logic circuits and their functions including the elementary microprocessor. Basic function of electronic components including ideal diodes and transistors; tuned circuits. Lab assignments complement lecture. Enrollment limited to 200. May be taken on video at some of Stanford’s Overseas Centers; see Overseas Studies for details. Lab. Prerequisites: Physics 43 and 45. GER:2b (DR:6)

5 units, Aut, Spr (Khuri-Yakub)


4 units, Win (Bravman)

Spr (Sinclair)

60. Engineering Economy—May be taken by freshmen, but recommended for second year or higher students Economic analysis for choice among alternatives. Use of compound interest calculations. Selection of appropriate minimum attractive rates of return. Effects of depreciation, sources of funds, and income tax. Analysis of decisions under uncertainty. Discussion section in French for students in the French and Engineering program. Prerequisite: Math. 41 or equivalent. Recommended: previous knowledge of elementary probability.

3 units, Aut, Win (Jucker)

Sum (Bhimjee)

62. Introduction to Optimization—Theory and computation of optimal selection of decisions under certainty. Linear programming, network optimization models, dynamic programming, non-linear programming, integer programming. Applications from a variety of areas, emphasizing high-level problems frequently faced by industrial engineers and management scientists. Prerequisite: Math. 43 or consent of instructor. GER:2b (DR:6)

4 units, Aut, Spr (Staff)

63Q. Stanford Introductory Seminar: Engineering Applications in Medicine—Preference to sophomores. Introduction to the diverse applications of engineering to problems in medicine and health care. Topics: applications of engineering mathematics, systems analysis, and decision analysis to health policy problems; assessment of medical technologies; risk analysis applications in medicine; computer science applications in medicine (e.g., decision support systems); applications of biochemical engineering; design and engineering for medical instrumentation; mechanical and electrical engineering applications in medicine (e.g., advanced prostheses, mechanical ears, implantable defibrillators, electrical nerve replacements); and aerospace medicine.

3 units, Aut (Brandeau, Owen)

70A. Programming Methodology—(Enroll in Computer Science 106A.)

5 units, Aut (Robertis)

Win (Plummer)

Spr (Staff)

70X. Programming Methodology and Abstractions (Accelerated)—(Enroll in Computer Science 106X.)

5 units, Aut (Plummer)

Win, Spr (Staff)

100. Teaching Public Speaking—Theory and practice of teaching public speaking and presentation development. Lectures/discussions on developing an instructional plan, using audiovisual equipment for instruction, devising tutoring techniques, and teaching delivery, organization, audience analysis, visual aids, and unique speaking situations. Weekly practice speaking. Students serve as apprentice speech tutors. Those completing course may become paid speech instructors in the Technical Communications Program. Prerequisite: consent of instructor.

5 units, Aut, Win, Spr (Lougee, Staff)

102E. Technical/Professional Writing for Electrical Engineers—Required of Electrical Engineering majors. Examines process of writing technical/professional documents. Lectures, writing assignments, individual conferences. Pre- or corequisite: Electrical Engineering 121, or consent of instructor.

(AU)

1 unit, Win, Spr (Lougee)
102S. Writing: Special Projects—Structured writing instruction for students working on non-course related materials (theses, dissertations, journal articles). Weekly individual conferences.

1-5 units, Aut, Win, Spr (Staff)

102W. Technical and Professional Writing—Explores, systematically, the process of writing technical and professional documents; lectures/discussions on analyzing audiences, defining purpose, generating and selecting appropriate report materials, structuring and designing clear and convincing reports, drafting effective reports, and editing reports that are clear, concise, emphatic, and mechanically and grammatically “clean.” Weekly writing assignments and individual conferences.

3 units, Aut, Win, Spr (Lounge)

103. Public Speaking/Presentation Development—Priority given to Engineering students. Introduction to the full range of speaking activities, from impromptu talks to carefully rehearsed formal professional presentations. How to organize and write speeches for a variety of occasions, analyze audiences, create and use appropriate visual aids, combat nervousness, and deliver informative and persuasive speeches effectively. Students become confident speakers through weekly practice in class, rehearsals in one-on-one tutorials, and videotaped feedback. Enrollment limited.

3 units, Aut, Win, Spr (Staff)


3-4 units, Aut (Staff)

105. Feedback Control Design—Design of linear feedback control systems for command-following error, stability, and dynamic response specifications. Root-locus and frequency response design techniques. Examples from a variety of fields. Some use of computer aided design with MATLAB. Prerequisite: Electrical Engineering 102, or Mechanical Engineering 161.

3 units, Aut (DeBra) Win (Franklin)


3 units, Aut (Horne)

121. Natural Gas Engineering—(Same as Petroleum Engineering 172.) See 221.

3 units (Aziz) not given 1997-1998

130. Science, Technology, and Contemporary Society—(Same as Science, Technology, and Society 101.) Analysis of the interplay of science, technology, and society in the contemporary U.S. Topics: key social, cultural, and values issues raised by contemporary scientific and technological developments; distinctive features of science and engineering as socio-technical activities; major influences of scientific and technological developments on 20th-century society, including transformations and problems of work, leisure, human values, the fine arts, and international relations; ethical conflicts in scientific and engineering practice; and the social shaping and management of contemporary science and technology. Optional section for extra unit. GER:3b(DR:9)

4-5 units, Aut (McGinn)

131. Ethical Issues in Engineering—(Same as Science, Technology, and Society 115.) Examination of ethical issues in contemporary engineering practice. Topics: the moral rights and responsibilities of engineers in relation to society, employers, colleagues, and clients; cost-benefit-risk analysis, safety, and informed consent; the ethics of whistleblowing; ethical conflicts of engineers as expert witnesses and managers; ethical issues in engineering design, manufacturing, and operations; ethical issues arising from engineering work in foreign countries; and ethical implications of the social and environmental contexts of contemporary engineering. Use of real-life case studies, guest practitioners, and field research. Limited enrollment.

4 units (McGinn) given 1998-1999

140A. Management of Technology Ventures—Open to TVC Fellows only. First of three-part sequence for students selected to the Technology Ventures Co-op (TVC) program. Focuses on aspects of functional operations and leadership in high technology start-ups: entrepreneurial skills related to product/market strategy, venture financing and cash flow management, team building and leadership strategies, and the challenges of managing growth and handling adversity in start-ups. Other engineering faculty, start-up founders, and venture capitalists participate as appropriate. Recommended: accounting or finance course (Industrial Engineering 133, Economics 90 or Engineering 60).

3 units, Spr (Byers)

140B. Management of Technology Ventures—Open to TVC Fellows only. Taken summer during
the work tour at a technology start-up. Students meet to exchange experiences and continue the formal learning process, and keep a journal of activities.

3 units, Sum (Byers)

140C. Management of Technology Ventures—Open to TVC Fellows only. Taken following the work tour. Allows students, faculty, employers, and venture capitalists to share and compare recent co-op experiences and analytical frameworks. Students develop “living” case studies and integrative project reports.

1 or more units, any quarter. (Staff)

151. French Media and Communications—(Enroll in French 127.) Note: the first of the Technological and Scientific French series is French 126. See the “French” section in this bulletin.

3 units, Win (Staff)

152. Technocritique—(Enroll in French 128.)

3 units, Spr (Dupuy)

153. Advances of Technology in Europe: Bioengineering—(Enroll in French 129.)

3 units, Spr (Prieur)

160. Ordinary Differential Equations and their Applications—The advanced theory of ordinary differential equations, emphasizing modeling engineering systems, nonlinear phenomena, and the use of computational tools. Applications are developed concurrently with the mathematical theory including nonlinear mechanical oscillators, population biology, chemical reaction engineering, and electrical circuits. Balance laws, dimensional analysis and similarity, numerical methods, MATLAB, systems of equations, eigenvalues and eigenvectors of differential operators, bifurcation theory, higher dimensional nonlinear systems, phase space methods, introduction to chaos theory. Limited enrollment. Prerequisite: Math. 130 or Mechanical Engineering 100.

3 units, Aut (Homsy)

199. Special Studies in Engineering—Special studies, lab work, or reading under the direction of a faculty member. Often research experience opportunities exist in ongoing research projects. Students make arrangements with individual faculty and enroll in the section number corresponding to the particular faculty member. Prerequisite: consent of instructor.

1 or more units, any quarter. (Staff)

PRIMARILY FOR GRADUATE STUDENTS

205. Introduction to Control Design Techniques—Review of root-locus and frequency response techniques for control system and analysis, and synthesis. Introduction to: digital control design and the z-transform; state-space techniques for simulation, pole-placement, LQR, and observer design; parameter identification. Examples from a variety of fields. Lab experiments on computers connected to mechanical systems. Prerequisites: 105 (or equivalent), Math. 103.

3 units, Aut (Rock)


4 units, Spr (Rock)

207A. Modern Control Design I—Design and analysis of digital controllers using classical and state space techniques. Discretization of continuous systems, z-transforms, and direct digital design. Pole placement and optimal quadratic regulators for single-input/single-output and multiple-input/multiple-output discrete systems. Discrete observers and optimal estimators. Lab experiments on computers connected to an analog system. Prerequisites: 205; Math. 103 or Mechanical Engineering 200A.

3 units, Win (Jones)

207B. Modern Control Design II—Design of optimal controllers and estimators for systems with stochastic disturbances. Basic probability theory, identification techniques, recursive filtering, duality, and properties of optimal regulators. Sensitivity, robustness, and design trade-offs. Extensions to other cost functions. Lab experiments on computers connected to mechanical systems. Prerequisite: 207A. Recommended: Electrical Engineering 278 or Statistics 116.

3 units, Spr (Parkinson)


3 units, Win (Rock)

ation. Fixed-order robust control design. Prerequisite: 208C.

3 units each, Win, Spr (How)

211. System Identification—Construction of dynamic models from input-output data. Least squares and Maximum Likelihood methods. Parameter estimation and identifiability. Frequency and time domain methods. Linear and nonlinear systems. Error modeling for control. Simple lab experiments performed. Prerequisite: Electrical Engineering 363 or 208A.

3 units, Aut (How)


220A. 3 units, Aut (Zhao)
220B. 3 units, Win (Papanicolaou)
220C. 3 units, Spr (Papanicolaou)


3 units (Aziz) not given 1997-1998

235A,B. Space Systems Engineering—40-50 students, mostly from engineering, science, and business, form a team to prepare a preliminary design study of a space system. International engineers have joined the team to define an initiative to put humans on Mars by 2010. Continued studies with Japan, Russia, and Europe define space vehicles for the missions. About 20 invited speakers from government and industry give the necessary background information. End of the second quarter, class gives a verbal briefing to government and industry representatives and publishes a final report on the system. Prerequisite: senior or graduate standing in Engineering or Physics, or consent of instructor.

235A. 3 units, Win (Lusignan)
235B. 3 units, Spr (Lusignan)

297A,B,C. Ethics of Development in a Global Environment (EDGE)—(Same as Anthropology 133A,B,C.) Wednesday evening seminars on world affairs, mostly on issues affecting poor nations. Autumn Quarter treats war and peace: the background of current wars and peace negotiations, the UN peace keeping efforts, war and religion, arms trade. Winter Quarter treats international resources and commerce: the debt crisis, environmental protection, resource depletion, Japan in the world economy, aid and monetary institutions. Spring Quarter treats “poverty and prejudice”: development models, comparative national health, AIDS, control of wealth, India-China-Africa America today. Speakers from Stanford and other institutions are experts who deal directly with world policy makers through research and advisory activities.

1-4 units, Aut, Win, Spr (Lusignan, Gupta)

298. Seminar in Fluid Mechanics—Interdepartmental seminar on problems in all branches of fluid mechanics, with talks by visitors, faculty, and students. Graduate students may register for 1 unit, without letter grade; a letter grade is given for talks. (AU)

1 unit, Aut, (Baganoff)
Win (Monismith)
Spr (Alonso)

299. Special Studies in Engineering—Special studies, lab work, or reading under the direction of a faculty member. Students enroll in the section number corresponding to the particular faculty member. Prerequisite: consent of the instructor.

1 or more units, any quarter (Staff)

610. Manufacturing Systems Analysis—(Same as Business T610.) Causal models of material flow in manufacturing systems. Topics: capacity and capacity utilization; functions of inventory; the manufacturing enterprise as a linear economic system; product structure and requirements planning; models of manufacturing response time; product portfolios and manufacturing flexibility. Emphasis is on descriptive modeling.

4 units, Aut (Harrison)

611. Understanding Manufacturing Processes—(Same as Business T611.) Provides a framework for understanding the technology of modern manufacturing processes, focusing on the key factors in developing an understanding of any manufacturing process. Topics: underlying microscopic physical and analytical theories; steps that control the performance, quality, and cost of the product; the history of the process; and the potential for improvement through research. Examples of fabrication processes (e.g., semiconductor devices, precision machining).

4 units (Cutkosky, Wood)

612. Manufacturing Organization—(Same as Business T612.) Overview of organization theory, research, and research methods relevant to the study
of manufacturing systems. Conceptual domains include selection, socialization, promotion systems, reward systems, job design, creativity, innovation, social networks, group problem-solving, and the relationship between technology and social structure. Research focuses on papers that used organizational theory and methods to understand behavior of and in manufacturing settings.

4 units (Staff) given 1998-99

613. Design for Manufacturability—(Same as Business T613.) Structured methodologies of the DFM process, emphasizing the pivotal role of design in manufacturing effectiveness. Topics: the initial stages of the concurrent engineering process including functional analysis, benchmarking, quality function deployment, value analysis, cost drivers, design for assembly and serviceability, design for process, and advanced research issues on these topics. Projects involve independent study of the design and manufacture of a product currently in production leading to a new product definition offering improved competitive advantage.

4 units, Win (Martin)

614. Manufacturing Performance Measurement—(Same as Business T614.) Managerial accounting as a discipline is devoted to modeling manufacturing processes and representing physical events in economic terms: fundamental issues in measurement theory, cost-volume-profit analysis, activity-based costing, variance analysis, and the costs and benefits of flexibility. Finance functions: capital investment in technology, interactions with the financial markets, capital structure, and taxation. Quality, where modeling of economic effects is a relatively recent phenomenon: statistical process control, cost of quality measures, ISO 9000, the Baldrige Award process, and environmental protection.

4 units (Patell) given 1998-99

615. Manufacturing Information and Coordination—(Same as Business T615.) Systems for sharing information, coordinating activities, and aligning different objectives in a manufacturing organization. Cross-functional coordination, goal conflicts among agents, design of incentives, resource allocation. The information systems that support coordination activities through a value delivery chain (systems for order entry, master scheduling, requirements planning, product scheduling, and material flow control).

4 units (Whang) given 1998-99

616. Proseminar in Manufacturing Education—(Same as Business T616.) For students in the Future Professors of Manufacturing Program; open to others with consent of instructor. Presentation of a core module, invited speakers from academia, industry, and government. Discusses manufacturing topics not covered in traditional courses which are needed to help prepare students for academic careers in manufacturing.

1 unit, Aut, Win, Spr (Reis)

OVERSEAS STUDIES

These courses are approved for the School of Engineering and taught overseas at the campus indicated. Students should discuss with their major department adviser which courses would best meet individual needs. Descriptions are in the “Overseas Studies” section of this bulletin or at the Overseas Studies office, 126 Sweet Hall.

40B. Introductory Electronics
5 units, Aut, Win, Spr (Masters)

50B. Introductory Science of Materials
4 units, Aut, Win, Spr (Bravman)

KYOTO

40K. Introductory Electronics
5 units, Spr (Masters)

50K. Introductory Science of Materials
4 units, Spr (Bravman)

197K. Engineering and the Modern City
3 units, Spr (Tamura)

PARIS

50P. Introductory Science of Materials
4 units, Aut, Win (Bravman)

AERONAUTICS AND ASTRONAUTICS

Chair: George S. Springer
Associate Chair: Brian J. Cantwell
Associate Professors: Fu-Kuo Chang, Ilan Kroo, Sanjiva Lele, Stephen Rock
Assistant Professors: Juan Alonso, Jonathan How
Professors (Research): Richard Christensen, Per Enge, Steven W. Tsai
Courtesey Professors: Ronald K. Hanson, Lambertus Hesselink
Lecturer: Thomas Pulliam
Consulting Professors: Robert T. Jones, Bernard Ross, Michael Tauber, Robert Twiggs
The Department of Aeronautics and Astronautics (AA) prepares students for professional positions in industry, government, and academia by offering a comprehensive program of graduate teaching and research. In this broad program, students have the opportunity to learn and integrate multiple engineering disciplines. The program emphasizes structural, aerodynamic, guidance and control, and propulsion problems of aircraft and spacecraft. Courses in the teaching program lead to the degrees of Master of Science, Engineer, and Doctor of Philosophy. Undergraduates and doctoral students in other departments may also elect a minor in Aeronautics and Astronautics.

Requirements for all degrees include courses on basic topics in aeronautics and astronautics, as well as in mathematics, physics, and applied mechanics.

The current research and teaching activities cover a number of advanced fields, with special emphasis on:

- Active Noise Control
- Aerodynamic Noise
- Aeroelasticity
- Aircraft Design, Performance, and Control
- Applied Aerodynamics
- Biomedical Mechanics
- Computational Aerodynamics
- Computational Fluid Dynamics
- Control of Robots, including Space and Deep-Underwater Robots
- Conventional and Composite Structures/Materials Systems Optimization
- Direct and Large-Eddy Simulation of Turbulence
- High-Lift Aerodynamics
- Hypersonic and Supersonic Flow
- Inertial Instruments
- Multidisciplinary Design Optimization
- Navigation Systems (especially GPS)
- Optical Diagnostics in Fluid Dynamics
- Optimal Control, Estimation, System Identification
- Physical Gas Dynamics
- Robust Control of Flexible Spacecraft
- Spacecraft Design and Satellite Engineering
- Shock Tube Studies of Vortex Interactions
- Turbulent Flow and Combustion

INSTRUCTION AND RESEARCH FACILITIES

The work of the department is centered in the William F. Durand Building for Space Engineering and Science. This 120,000 square foot building houses advanced research and teaching facilities and concentrates in one complex the Department of Aeronautics and Astronautics as well as the activities of other engineering organizations allied in space exploration and aerospace technology.

The Global Positioning System (GPS) Laboratory is engaged in research on precise aircraft and ground vehicle navigation. The laboratory has extensive equipment including approximately 20 carrier phase receivers and has built approximately 15 pseudolites for centimeter level positioning research. A nationwide network of reference stations has been installed for evaluation of the Wide Area Differential GPS concept. The laboratory has performed extensive flight testing in a small aircraft.

The Aerospace Robotics Laboratory (ARL) is developing advanced robot systems and control techniques applicable to industrial automation and space and underwater robotics. Experimental research facilities include very-flexible-beam manipulators, SCARA-configured manipulators with flexible drive trains, quick mini-manipulators, and pairs of cooperating manipulators. A collection of model free-flying space robots that experience the dynamics of space through the use of air-cushion support systems makes possible leading-edge research in space-manipulator system dynamics. Our object-based control puts the human operator at the task command level. We work closely with the Computer Science Robotics Laboratory on task-planning/task-execution systems and with the GPS Laboratory on the navigation and control of autonomous systems.

The ARL computing facilities include a dozen Sun-Spare workstations for control system design, analysis, and simulation; for real-time software development; for mechanical and electrical CAD; and for documentation. The workstations are complemented by a collection of real-time control computers networked by the labwide LAN. These microprocessor-based, single-board computers are used in multiprocessor configurations for implementing and testing control algorithms on experimental hardware.

The Guidance and Control Laboratories include a wide spectrum of specialized facilities for making and testing novel instruments of extremely high precision. The facilities include active table-levelling (0.1 arc sec); spacecraft thruster evaluation chamber for force measurement down to a dyne; spherical gyrorotor alignment facility (optical-to-principal-axis alignment less than 1 arc sec); an air cushion vehicle to simulate the Stanford Drag-Free Satellite in an orbital dynamic environment to an altitude of 275 km.; an air-bearing simulator for tethered satellite simulation and for spinning-spacecraft attitude control to a few arc secs; plus facilities for a number of inertial instrument test stands on an isolated test pad.
with visual access to Polaris. Clean facilities, ultra precision machining, and advanced electronics design and fabrication support the guidance, control, and instrumentation experiments. A new facility enables the testing of systems for controlling flexible spacecraft on laboratory models. This facility includes dedicated high-capacity digital control computers. Cryogenic gyro test facilities are available in the nearby Varian Physics Building, and Electrical Engineering's Integrated Circuit Fabrication Facility is adjacent. Active flutter suppression research is performed in the 0.5 m x 0.5 m low-speed wind tunnel. Computer-aided engine test facilities are available in the Mechanical Engineering Laboratories and are an integral part of the Guidance and Control research program.

The spacecraft design program is a total life-cycle space mission program. The Satellite Systems Development Laboratory (SSDL) provides the opportunity for building, testing, and operating low earth-orbiting microsatellites. Students at the master's degree level participate in mission planning, project management, spacecraft design, fabrication, testing, launch integration, and mission operations. Students in the engineer's and doctoral programs are involved with multiyear satellite programs for more complex missions. These programs involve direct interaction with payload customers and industry in both design and operations.

The Aircraft Aerodynamics and Design Group is involved with research in applied aerodynamics and aircraft design. Their work ranges from the development of computational and experimental methods for aerodynamic analysis to studies of unconventional aircraft concepts and new architectures for multidisciplinary design optimization.

The Flow Physics and Computation Division (FPC) is a joint laboratory between the Departments of Aeronautics and Astronautics and Mechanical Engineering. The FPC offers courses in numerical analysis, computational fluid mechanics, compressible flow, aerodynamics, propulsion, acoustics and applied mathematics.

The goal of the FPC is to carry out basic research leading to the development of improved computational tools and physical models for accurate engineering design, analysis and control of complex flows. Problems of interest include aerodynamics, electronics cooling, propulsion, material processing, planetary entry, power systems and semiconductor manufacturing. Research is conducted in a variety of disciplines including acoustics, chemical reactions, plasmas, flow interactions with electromagnetic waves, combustion, data display and processing, environmental fluid mechanics, flow control, numerical analysis, and scientific computing.

The computational facilities of the FPC include powerful workstations, color displays and reproduction facilities, and direct access to the major national computing facilities of the nearby NASA-Ames Research Center which includes CRAY C90s and massively parallel super computers. The Center for Turbulence Research (CTR), a research consortium between Stanford and NASA, is affiliated with this group. The intellectual atmosphere of the Flow Physics and Computation Division is greatly enhanced from interactions with CTR's large staff of postdoctoral researchers and distinguished visiting scientists.

Experimental fluid mechanics research is carried out using the facilities of the Aero-Fluid Mechanics Laboratories (AFML). Facilities include several laser sources and flow measuring systems, a high pressure shock tube, a flow visualization water channel and a temperature stabilized subsonic wind tunnel equipped with a unique free-to-roll, free-to-yaw high angle-of-attack model support system. Collaborative projects with NASA Ames provide Stanford faculty and graduate students access to a variety of large-scale experimental flow facilities. Research is directed at using experimentation to enhance a basic understanding of fluid flow phenomena with application to aeronautical systems including the aerodynamics of high lift systems, new propulsion concepts and advanced aerodynamic measurement techniques.

Excellent facilities exist in the Fourier Optics and Optical Diagnostics Laboratory for the development and evaluation of new diagnostic techniques, including stable continuous wave and pulsed laser sources, extensive optical and electronic equipment, and a complete stand-alone digital image processing computer, linked to a SUN 3-260, several SUN workstations, and two Silicon Graphics Iris machines.

The Structures and Composites Laboratories include facilities for studying and testing the behavior of small-scale structures of metal and fiber reinforced composites. Equipment is also available to fabricate structural elements made of composite material using an autoclave, resin transfer molding, and hot press.

The department has over 100 computers in the Durand Building for use in the academic and research programs. Two clusters of Macintoshes and PCs are available for student use, and each research group is equipped with advanced workstations, Macintoshes, and/or PCs. In addition, computer clusters throughout the campus provide access to electronic mail, the WorldWide Web, and time-shared computation via the campus academic computer network. They are available to all students at no cost for their course work or unsponsored research.

Service facilities in the Durand Building include a chemistry lab and several conference rooms.
Attached to the building is a modern classroom building equipped for televising lectures; it contains a lecture auditorium.

Through the consortium arrangement between Stanford and the nearby NASA-Ames Research Center, students and faculty have access to one of the best and most extensive collections of experimental aeronautical research facilities in the world, as well as the latest generation of supercomputers.

INSTITUTES AND RESEARCH PROGRAMS

At the master’s level, a program in Computational Fluid Dynamics (CFD) is an option within the general structure of the master’s requirements. Students intending to seek a Ph.D. degree with an emphasis on CFD should take the CFD series AA 214A, B, C during their master’s year. Choice of math courses, theoretical and experimental dynamics courses, and electives most suitable for the CFD program should be done in consultation with the student’s adviser. Research topics in CFD are supervised by a number of faculty members in both the Department of Mechanical Engineering and the Department of Aeronautics and Astronautics. Students undertaking theses in CFD generally utilize the large computer facilities of the NASA-Ames Research Center through a cooperative program with the University.

The Joint Institute for Aeronautics and Acoustics (JIAA) is co-sponsored by Stanford University and NASA-Ames Research Center. The overall purpose of the JIAA is to prepare students for leadership in the nation’s aeronautics enterprise. The institute provides the environment necessary for long-term cooperative research and graduate education in specialized areas of aeronautics and acoustics. Stanford faculty, staff, and students collaborate with center staff on research topics motivated by problems facing the aeronautics industry. Current topics include active flow control, jet noise, aerodynamics and acoustics of high lift systems and application of luminescent paint to aerodynamic measurement.

The Center for Turbulence Research (CTR) is a research consortium for fundamental study of turbulent flows, jointly operated by Stanford and NASA-Ames Research Center. Its principal objective is to stimulate significant advances in the physical understanding of turbulence, leading to improved capabilities for control of turbulence and turbulence modeling for engineering analysis. Emphasis is placed on probing turbulent flow fields, developed by direct numerical simulations and/or laboratory experiments using new diagnostic techniques and mathematical methods, and on concepts for turbulence control and modeling. Although the role of the CTR is to advance the understanding of turbulent flows for aerospace applications, it is an interdisciplinary program; researchers with interest in turbulence are sought from aeronautics, mathematics, meteorology, oceanography, physics, and other areas.

GENERAL INFORMATION

Further information about the facilities and programs of the Department of Aeronautics and Astronautics is available on the World Wide Web (at http://aa.stanford.edu/) or by request from the department’s Student Services office.

The department has a very active student branch of the American Institute of Aeronautics and Astronautics, which sponsors films covering aerospace topics and monthly socials. It also conducts visits to nearby research, government, and industrial facilities, and sponsors a Young Astronauts Program in the local schools.

ADMISSION

To be eligible to apply for admission to the department, a student must have a bachelor’s degree in engineering, physical science, mathematics, or an acceptable equivalent. Students who have not yet received a master’s degree in a closely allied discipline will be admitted to the master’s program; eligibility for the Ph.D. program is considered after the master’s year (see “Doctor of Philosophy” below). Applications for all degree programs are accepted throughout the year, although applications for fellowship aid must be received and completed by February 1 for the next Autumn Quarter.

Information about admission to the Honors Cooperative Program is included in the “School of Engineering” section of this bulletin.

Further information and application forms may be obtained from Graduate Admissions, the Registrar’s Office (http://www-leland.stanford.edu/dept/registrar/gradadmis/).

WAIVERS AND TRANSFER CREDITS

Students may receive departmental waivers of required courses for the M.S. degree in Aeronautics and Astronautics by virtue of substantially equivalent and satisfactorily performed course work at other institutions. A format memo (signed by the course instructor and adviser) should be submitted to the Candidacy Committee through the Student Services office indicating (1) the Stanford University course number and title, and (2) the institution, number(s), and title(s) of the course(s) wherein substantially equivalent material was treated.

A similar procedure should be followed for transfer credits. Please note, however, that transfer credit is allowed only for courses taken as a graduate student in which equivalence to Stanford courses is established and for which a grade of ‘B’
or better has been awarded. The number of transfer credits accepted for each degree (M.S., Engineer, and Ph.D.) is delineated in the “Graduate Degrees” section of this bulletin.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

Although primarily a graduate-level department, Aeronautics and Astronautics offers an interdisciplinary program in Aeronautics and Astronautics (AA) leading to the B.S. degree in Engineering. For further information, see the “School of Engineering” section of this bulletin and the Undergraduate Handbook, available from the Office of the Dean of Engineering.

For information about an AA undergraduate minor, see the “School of Engineering” section of this bulletin.

COTERMINAL PROGRAM

This special program allows Stanford undergraduates an opportunity to work simultaneously toward a B.S. in another field and an M.S. in Aeronautical and Astronautical Engineering. General requirements for this program and admissions procedures are described in the “School of Engineering” section of this bulletin. Admission is granted or denied through the departmental faculty Admissions and Awards Committee. A coterminal student must meet the course and scholarship requirements detailed for the M.S. below.

GRADUATE PROGRAMS

MASTER OF SCIENCE

The University’s basic requirements for the master’s degree are outlined in the “Graduate Degrees” section of this bulletin. Students with an aeronautical engineering background should be able to qualify for the master’s degree in three quarters of work at Stanford. Students with a bachelor’s degree in physical science, mathematics, or other areas of engineering may find it necessary to take certain prerequisite courses, which would lengthen the time required to obtain the master’s degree. The following are departmental requirements.

SCHOLARSHIP REQUIREMENTS

A minimum grade point average (GPA) of 2.75 is required to fulfill the department’s M.S. degree requirements and a 3.0 is the minimum required for eligibility to attempt the Ph.D. qualifying examination. It is incumbent upon both M.S. and potential Ph.D. candidates to request letter grades in all courses except those that do not offer a letter grade option and those that fall into the categories of colloquia and seminars (for example, AA 293, 297, and 298). Insufficient grade points on which to base the GPA may delay expected degree conferral or result in refusal of permission to take the qualifying examinations. Candidates with GPAs of 3.0 through 3.2 must request the permission of the Candidacy Committee to attempt the qualifying examinations.

AERONAUTICS AND ASTRONAUTICS

(45 Quarter units)

The master’s program in Aeronautics and Astronautics (AA) is designed to provide a solid grounding in the basic disciplines and a foundation for systems engineering. All candidates for this degree are expected to meet the basic course requirements in fluid mechanics, structural mechanics, guidance and control, propulsion, and experimentation in aeronautics and astronautics (Category A below), in addition to work in applied mathematics (Category B) and technical electives (Category C).

A. Basic Courses—Candidates select eight courses as follows:
1. Five courses in the basic areas of Aeronautics and Astronautics (one each):
   a) Fluids: 200A or 210A
   b) Structures: 240A
   c) Guidance and Control: 242
   d) Propulsion: 280 or 283
   e) Experimentation: 236A or 290; or Engr. 205, 206, or 207B
2. Three courses, one each from three of the areas below:
   a) Fluids: 200A or 210A
   b) Structures: 240B or 256
   c) Guidance and Control: 271A or 279A
   d) One course selected from AA courses numbered 200 and above, excluding seminars and independent research.

Candidates who believe they have satisfied a Basic Courses requirement in previous study may request a waiver of one or more courses (see “Waivers and Transfer Credits” above). If a requirement in fluids, structures, or guidance and control in item 1 is waived, it is expected that a course in the same category from item 2 will be substituted.

B. Mathematics Courses—During graduate study, each candidate is expected to develop a competence in the applied mathematics pertinent to his or her major field. This requirement can be met by matriculating in a minimum of 6 units in either (1) applied mathematics (for example, linear algebra, partial differential equations, complex variables, probability), or (2) technical electives that strongly emphasize applied mathematics. A list of courses approved for the mathematics requirement is available in the departmental Student Services office. (Calculus, ordinary differential equations, and vector analysis are fundamental mathematics prerequisites, and will not satisfy the master’s mathematics requirement.)
percent of the major-field Ph.D. qualifying examination is devoted to pertinent mathematics.

C. Technical Electives—Candidates, in consultation with their advisers, select at least four major-field courses (in addition to those taken under Category A) from among the three-digit-series courses offered by the departments of the School of Engineering and the Department of Physics in the School of Humanities and Sciences. This requirement increases by one course (taken in either the major or peripheral fields) for each basic course that is waived. Technical electives taken in satisfaction of the mathematics requirement (category B) may not also be counted in this four-course minimum.

D. Other Electives—It is recommended that all candidates enroll in at least one humanities or social science course. Practicing courses in, for example, art, music, and physical education, do not qualify in this category.

When planning their programs, candidates should check course descriptions carefully to ensure that all prerequisites have been satisfied. A course that is taken to satisfy a prerequisite for courses in Category A (Basic Courses) or B (Mathematics) cannot be counted as a technical elective, but can count toward the M.S. degree in Category D (Other Electives).

ENGINEERING
(45 Quarter Units)

Students whose career objectives require a more interdepartmental or narrowly focused program than is possible in the M.S. program in Aeronautics and Astronautics (AA) may pursue a program for an M.S. degree in Engineering. This program is described in the School of Engineering “Graduate Programs of Study” section of this bulletin.

Sponsorship by the Department of Aeronautics and Astronautics in this more general program requires that the student file a proposal before completing 18 units of the proposed graduate program. The proposed program must include at least 12 units of graduate-level work in the department and meet rigorous standards of technical breadth and depth comparable to the regular AA Master of Science program. The proposal must be accompanied by a statement explaining the objectives of the program and how the program is coherent, contains depth, and fulfills a well-defined career objective. The grade and unit requirements are the same as for the M.S. degree in Aeronautics and Astronautics.

ENGINEER

The degree of Engineer represents an additional year (or more) of study beyond the M.S. degree and includes a research thesis. The program is designed for students who wish to do professional engineering work upon graduation and who want to engage in more specialized study than is afforded by the master’s degree alone. It is expected that fulltime students will be able to complete the degree in two years of study after the master’s degree.

The University’s basic requirements for the degree of Engineer are outlined in the “Graduate Degrees” section of this bulletin. The following are department requirements. The candidate’s prior study program should have fulfilled the department’s requirements for the master’s degree or a substantial equivalent. Beyond the master’s degree, a total of 45 units of work is required, including a thesis and a minimum of 30 units of courses chosen as follows:

1. Twenty-four units of approved electives, of which 9 shall be in mathematics or applied mathematics. The remaining 15 units shall be chosen in consultation with the adviser, and represent a coherent field of study related to the thesis topic. Suggested fields include: (a) acoustics, (b) aerospace structures, (c) aerospace systems synthesis and design, (d) analytical and experimental methods in solid and fluid mechanics, (e) computational fluid dynamics, and (f) guidance and control.

2. Six units of free electives.

Candidates for the degree of Engineer are expected to have a minimum grade point average (GPA) of 3.0 for work in courses beyond those required for the master’s degree. All courses except seminars and directed research should be taken for a grade.

DOCTOR OF PHILOSOPHY

The University’s basic requirements for the Ph.D. degree are outlined in the “Graduate Degrees” section of this bulletin. Department requirements are stated below.

Qualifications for candidacy for the doctoral degree are contingent on:

1. Fulfilling department requirements for the master’s degree or its substantial equivalent.
2. Maintaining a high scholastic record for graduate course work at Stanford.
3. Completing 3 units of a directed research problem (AA 290 or an approved alternative).
4. In the first year of doctoral study, passing an oral Ph.D. qualifying examination given by the department during Autumn and Spring Quarters (following mid-term exams but before Dead Week).

Detailed information about the nature and scope of the Ph.D. qualifying examination can be obtained from the department. Research on the doctoral dissertation may not be formally started before passing this examination.

Beyond the master’s degree, a total of 90 additional units of work is required, including a minimum of 36 units of approved formal course work (excluding research, directed study, and
semesters). The courses should consist primarily of graduate courses in engineering and sciences, and should form a strong and coherent doctoral program. At least 12 units must be from graduate-level courses in mathematics or applied mathematics. University requirements for continuous registration do apply to doctoral students for the duration of the degree, including registration for each quarter in which the student requires department consultation to complete dissertation work.

University Oral and Dissertation—The Ph.D. candidate is required to take the University oral examination after the dissertation is substantially completed (with the dissertation draft in writing) but before final approval. The examination consists of a public presentation of dissertation research, followed by substantive private questioning on the dissertation and related fields by the University oral committee (four selected faculty members, plus a chair from another department). The University oral normally occurs toward the end of the fourth doctoral year. Once the oral has been passed, the student finalizes the dissertation for reading committee review and final approval. Forms for the Ph.D. reading committee and University oral scheduling are submitted with a one-page dissertation abstract at least three weeks prior to the date of the oral.

Ph. D. MINOR

A student who wishes to obtain a Ph.D. minor in Aeronautics and Astronautics should consult the department office for designation of a minor adviser. A minor in Aeronautics and Astronautics may be obtained by completing 20 units of graduate-level courses in the Department of Aeronautics and Astronautics, following a program (and performance) approved by the department's Candidacy Chair.

The student’s Ph.D. reading committee and University oral committee must each include at least one faculty member from Aeronautics and Astronautics.

FELLOWSHIPS AND ASSISTANTSHIPS

Fellowships and course or research assistantships are available to qualified graduate students. Fellowships sponsored by Gift Funds, Stanford University, and Industrial Affiliates of Stanford University in Aeronautics and Astronautics provide grants to first-year students for the nine-month academic year to cover tuition and living expenses. Stanford Graduate Fellowships, sponsored by the University, provide grants for three full years of study and research; each year, the department is invited to nominate several outstanding doctoral or predoctoral students for these prestigious awards. Students who have excelled in their master's-level course work are eligible for course assistantships in the department; those who have demonstrated research capability are eligible for research assistantships from individual faculty members. A half-time course or research assistantship provides a semimonthly living stipend and a 9-unit tuition grant per quarter. Research assistants may be given the opportunity of full-time summer employment at twice the half-time rate. They may use their work as the basis for a dissertation or Engineer’s thesis.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

(AU) indicates that the course is subject to the University Activity Unit limitations for undergraduates (8 units maximum).

100. Introduction to Aeronautics and Astronautics—The principles of fluid flow, flight, and propulsion; the creation of lift and drag, aerodynamic performance including take-off, climb, range, and landing performance, structural concepts, propulsion systems, trajectories, and orbits. Remarks on the history of aeronautics and astronautics. Prerequisites: Math. 41, 42; elementary physics. GER: 2b

3 units, Aut (Alonso)

104. Dynamic Behavior—(Enroll in Engineering 104.)

105. Feedback Control Design—(Enroll in Engineering 105.)

200A. Applied Aerodynamics—Review of fundamental equations of fluid dynamics and the physical assumptions on which they are based; overview of appropriate methods for solving these equations including nonlinear CFD, conformal mapping, linear panel and vortex methods; estimation of pressure distributions and resultant airloads on 2-D airfoils, finite wings, slender bodies, and lifting systems; compressibility effects; boundary layer analysis and prediction of drag, separation, and displacement effects. Application to airfoil and wing design. Prerequisite: undergraduate aerodynamics course. Recommended: 210A.

3 units, Win (MacCormack)

201A. Fundamentals of Acoustics—Acoustic equations for a stationary homogeneous fluid; wave equation; plane, spherical, and cylindrical waves; harmonic (monochromatic) waves; simple sound radiators; reflection and transmission of sound at interfaces between different media; multipole analysis of sound radiation; Kirchoff integral representation; scattering and diffraction of sound; propagation through ducts—dispersion, attenuation, group velocity; sound in enclosed regions—reverberation, absorption, and dispersion; radiation from moving sources; propagation in the atmosphere and underwater. Prerequisites: first-year graduate stand-
ing in engineering, mathematics, sciences; or consent of instructor.
3 units (Lele) alternate years, given 1998-99

201B. Topics in Aeroacoustics—Acoustic equations for moving medium, simple sources, Kirchhoff formula and multipole representation; radiation from moving sources; acoustic analogy approach to sound generation in compact flows; theories of Lighthill, Powell, and Mohring; acoustic radiation from moving surfaces; theories of Curl, FlowesWilliams, and Hawkings; application of acoustic theories to the noise from rotating blades; computational methods for acoustics. Prerequisite: 201A or consent of instructor.
3 units (Lele) not given 1997-98

204. Classical Aerodynamics—Selected topics emphasizing important results of classical wing theory. Early theories of Lanchester, Kutta, and Joukowski. Adaptation of Joukowski theory to modern airfoils and the home computer. Munk's thin airfoil theory. Reverse flow and reciprocal theorems. Slender wing theory, swept wings, oblique wings. Material for outside reading (Wing Theory, Robert T. Jones) and computer program available. Prerequisites: knowledge of elementary aerodynamics and complex variables.
1 unit (Jones)

205. Current Topics in Aerodynamic Design—Fundamental theory and simple computational methods are employed in a survey of recent aerodynamic design developments. Topics: airfoils (natural laminar flow, low Reynolds number airfoils, supercritical sections), wing design (optimization, winglets, swept-forward, and oblique wings), unconventional configurations (canard, three surface, tailless designs), propulsion (propfans, propellers, flapping flight), and applications of CFD in aircraft design. “Hands-on” experience with aerodynamic design problems using back-of-the-envelope analyses, microcomputer programs, and supercomputer results. Prerequisite: 200A.
3 units, Aut (Kroo)

3 units (Staff) not given 1997-98

210A. Fundamentals of Compressible Flow—Emphasis is on the development of the full threedimensional nonsteady field equations and the associated constitutive relations representing the working fluid. Examples for the specialized cases of flows in one and two dimensions; compressible Couette flow, normal shock wave, potential flow, linearized potential equation, lift and drag of thin airfoils, similarity rules for subsonic and supersonic flow, quasi-one-dimensional flow, conical flow, Prandtl-Meyer flow. Prerequisite: Mechanical Engineering 131B or equivalent. 3 units, Aut (Baganoff)

210B. Fundamentals of Compressible Flow—Continuation of 210A with emphasis on more general flow geometry. Use of exact solutions to explore the hypersonic limit. Identification of similarity parameters. Review of solution methods for the linearized potential equation with applications to wings and bodies in steady flow; relation to physical acoustics and wave motion in nonsteady flow. Nonlinear solutions for nonsteady constant area flow and introduction to Riemann invariants. Elements of the theory of characteristics; nozzle design; extension to nonisentropic flow. Real gas effects in compressible flow. Flows in various gas dynamic testing facilities. Prerequisite: 210A.
3 units, Spr (Alonso)

211A. Physical Gas Dynamics—Enroll in Mechanical Engineering 262A.)

213. Atmospheric Entry—High-speed atmospheric entry subjects vehicles to intense heating, decelerations, and structural loads. These are formulated and their intensity determined for a variety of flight paths. Trajectories range from nonlifting (ballistic) to constant lift and variable lift paths. Comparison of different heat shielding methods and their effectiveness. Applications: the Space Shuttle, aerospace plane, Mars landing and return missions, atmospheric probe vehicles, etc. Emphasis is on comprehension of fundamental physical principles. Recommended: understanding of compressible, equilibrium, and real gas flows (210A or equivalent).
3 units, Aut (Pulliam)

214A. Numerical Methods in Fluid Mechanics—The basic principles underlying the Navier-Stokes equations. Relations between time-accurate and relaxation methods. Implicit and explicit methods combined with flux splitting and space factorization. Considerations of accuracy, stability of numerical methods, and programming complexity. Prerequisites: knowledge of linear algebra and Mechanical Engineering 200A, 200B, or equivalent approved by instructor.
3 units, Aut (Pulliam)

3 units, Win (MacCormack)


3 units, Spr (MacCormack)

215A,B. Advanced Computational Fluid Dynamics—High resolution schemes for capturing shock waves and contact discontinuities; upwinding and artificial diffusion; LED and TVD concepts; alternative flow splittings; numerical shock structure. Discretization of Euler and Navier Stokes equations on unstructured meshes; relationship between finite volume and finite element methods. Time discretization; explicit and implicit schemes; acceleration of steady state calculations; residual averaging; math grid preconditioning. Automatic design; inverse problems and aerodynamic shape optimization via adjoint methods. Pre- or corequisite: 214B or equivalent.

3 units each, Win, Spr (Jameson)

217A,B,C. Mathematical and Computational Methods in Engineering—(Enroll in Mechanical Engineering 200A,B,C.)

218. Similitude in Engineering Mechanics—Application of symmetry methods to the reduction and simplification of physical problems: similarity rules revealed by dimensional analysis and other groups of transformations, incomplete similarity and the renormalization group; use of Lie groups in the generation of integrating factors for nonlinear ordinary differential equations, reduction of order, local solutions of autonomous systems; generation of similarity variables for partial differential equations, reduction of dimension; invariant groups of the classical equations of mathematical physics including the heat equation, wave equation, compressible and incompressible Navier-Stokes and Euler equations. Examples include laminar boundary layers, nonlinear heat conduction, shallow water waves, motion of viscous jets and vortex rings, similarity rules for turbulent shear flows. Prerequisite: Mechanical Engineering 200B or Math. 131, or consent of instructor.

3 units, Spr (Cantwell)

219. Computational Methods in Fluid Mechanics—(Enroll in Mechanical Engineering 269.)

225. Stochastic Processes in Aeronautics—Applications of probability theory to problems in aeronautics, emphasizing random behavior in fluid, thermodynamic, chemical, structural, and control systems of aerospace interest. The random-walk model introduces basic concepts and connects the topics. Time evolution of probability distributions, linking problems in chemical kinetics, rarefied gas flows, thermodynamic nonequilibrium, and finite difference methods in fluid mechanics. Statistical variables: power spectra, correlation functions, transform techniques, the response of a linear system to a random forcing function, and the statistical theory of turbulence. Stochastic models on microcomputers.

3 units (Staff) not given 1997-98

235A,B. Space Systems Engineering—(Enroll in Engineering 235A,B.)

236A. Spacecraft Design—Design of unmanned spacecraft and spacecraft subsystems with concentration on identification of design drivers and current design methods. Topics: spacecraft configuration design, mechanical design, structure and thermal subsystem design, attitude control, electric power, command and telemetry, and design integration and operations.

3 units, Win (Twiggs)

236B,C,D. Spacecraft Design—Continuation of 236A.

236B. 3 units, Spr (Twiggs)

236C. 3 units, Sum (Twiggs)

236D. 3 units, Aut (Twiggs)

240A. Analysis of Structures—Elements of two-dimensional elasticity theory. Boundary value problems; energy methods; analyses of solid and thin walled section beams, trusses, frames, rings, monocoque and semimonocoque structures. Prerequisite: Engineering 14 or equivalent.

3 units, Aut (Springer)


3 units, Win (F. Chang)

241A,B. Introduction to Aircraft Design, Synthesis, and Analysis—The total development of new aircraft systems emphasizing commercial aircraft; underlying economic and technological factors that create markets for new aircraft from rational and historical viewpoints; determining market demands and system mission performance require-
ments; optimizing configurations to comply with requirements, emphasizing the interaction of various disciplines (aerodynamics, structures, propulsion, guidance, payload, and ground support; parametric studies); applied aerodynamic and design concepts for use in configuration analysis (airplane layout, wing design, high lift systems, drag, stability and control requirements, and tail sizing). Application to an individually chosen aeronautical system; applied structural fundamentals emphasizing fatigue and fail-safe considerations; design load determination; weight estimation; propulsion system performance and installation; engine types; environmental problems (noise and smoke); performance estimation (takeoff, climb, cruise, and landing). Direct/indirect operating costs prediction and interpretation. Aircraft functional systems (hydraulic, electrical, environmental control); avionics; importance and achievement of aircraft reliability and maintainability. Prerequisite: 100 or equivalent.

241A. 3 units, Win (Kroo, Alonso)
241B. 3 units, Spr (Kroo)


3 units; Aut (Barrows)

244A. Free and Forced Motion of Structures—Vibrations and forced response of linear systems with a finite number of degrees of freedom. Vibrations and forced response of continuous structures, developed in a framework of analytical dynamics; rods, beams, membranes, and other elastic systems. Approximate methods for analyzing nonuniform and built-up structures. Finite-element methods in a dynamic context. Introduction to random responses and to nonlinear systems. Prerequisites: 240A, 242.

3 units, Win (Ashley)

245A. Continuum Mechanics: An Introduction—(Enroll in Mechanical Engineering 238A.)

245B. Continuum Mechanics: Nonlinear and Inelastic Materials—(Enroll in Mechanical Engineering 238B.)

246A. Theory of Plates—(Enroll in Mechanical Engineering 241A.)

246B. Theory of Shells—(Enroll in Mechanical Engineering 241B.)

246D. Vibration and Stability of Plates and Shells: Biomechanical Applications—(Enroll in Mechanical Engineering 241D.)

247A. Dynamical Systems—(Enroll in Mechanical Engineering 233A.)


3 units, Aut (F. Chang)

252. Techniques of Failure Analysis—Introduction to the field of failure analysis, including fire and explosion analysis, large scale catastrophe projects, traffic accident reconstruction, aircraft accident investigation, human factors, biomechanics and accidents, design defect cases, materials failures and metallurgical procedures, and structural failures. Product liability, failure modes and effects analysis, failure prevention, engineering ethics, and the engineer as expert witness.

2 units, Spr (Ross)

253. Wave Propagation—(Enroll in Math. 274.)


3 units, Win (Springer)


3 units, Spr (F. Chang)

261A. Statistical Theory and Modeling for Turbulent Flow Averaging and Correlations—(Enroll in Mechanical Engineering 261A.)

268. Digital Image Processing—(Enroll in Electrical Engineering 368.)

269. Optical Methods in Engineering Science—(Enroll in Electrical Engineering 347.)

270. Introduction to Modern Optics—(Enroll in Electrical Engineering 268.)
271A. Dynamics and Control of Spacecraft and Aircraft—The dynamic behavior of spacecraft and aircraft, and design of automatic control systems for them. For spacecraft in orbit: natural longitudinal and lateral dynamic behavior and design of attitude control systems using combinations of gravity gradient, reaction thrusting and control moment gyros; GPS-based attitude determination. For aircraft: natural longitudinal and lateral dynamic behavior and design of autopilots for flight path control, automatic landing, GPS navigation. Prerequisites: 200A or 208, 242, Engineering 105.
3 units, Spr (How)

3 units, Spr (Powell) alternate years, not given 1998-99

272C. Global Positioning System—Principles of satellite navigation using GPS. Positioning techniques using code tracking, single and dual frequency, and carrier aiding. Use of carrier tracking for attitude determination and precision position determination.
3 units (Enge, Parkinson) alternate years, given 1998-99

273A. Modern Control Design I—(Enroll in Engineering 207A.)

273B. Modern Control Design II—(Enroll in Engineering 207B.)

274A,B. Robust Control Analysis and Synthesis—(Enroll in Engineering 210A,B.)

275. Introduction to Control Design Techniques—(Enroll in Engineering 205.)

276. Control System Design and Simulation—(Enroll in Engineering 206.)

277. Optimal and Nonlinear Control—(Enroll in Engineering 209.)

279. Space Mechanics—Orbits of near-earth satellites and interplanetary probes; transfer and rendezvous; decay of satellite orbits; influence of earth's oblateness; sun and moon effects on earth satellites. Prerequisite: 242.
3 units, Win (Kasdin)

280. Rocket Propulsion—Introduction to liquid and solid propellant rockets, the rocket equation of motion, fundamentals of nozzle flow, engine performance parameters, thermochemical calculation of performance, heat transfer in rockets, solid propellant engine concepts, hybrid rockets, elements of electric propulsion, space sailing.
3 units, Win (Cantwell)

283. Aircraft Propulsion—Introduction to the design and performance of airbreathing engines. Topics: one-dimensional gasdynamics; discussion of physical parameters used to characterize engine performance; cycle analysis of ramjets, turbojets, turbofans, and turboprops; design of supersonic inlets and nozzles, component matching and the compressor map, combustors.
3 units, Aut (Cantwell)

290. Problems in Aeronautics and Astronautics—Investigation, experimental or theoretical, of problems in aeronautics and astronautics. Students may work in any field of special interest. Undergraduates must take for a letter grade for a minimum of 3 units to meet the WIM requirement. (WIM) 1-5 units, any quarter (Staff)

291. Practical Training—Educational opportunities in high-technology research and development labs in industry. Qualified graduate students engage in internship work and integrate that work into their academic program. Students register in the quarter of their internship work, and complete a research report outlining their work activity, problems investigated, key results, and any follow-on projects they expect to perform. Meets the requirements for Curricular Practical Training for students on F-1 visas. Sign up for section number corresponding to your academic adviser. Student is responsible for arranging own employment and should see department Student Services manager before enrolling.
1 unit, any quarter (Staff)

293. Seminar in Spacecraft Application—For undergraduates and graduates interested in small low-cost satellites, their applications in earth-orbiting and interplanetary exploration, and the commercial and scientific opportunities; others invited. Topics are related to the present small spacecraft mission planning, design, fabrication, and operation; presented by industry lecturers, faculty, and students. Registration for credit optional; letter grade given for students who make presentations. May be repeated for credit. (AU)
1 unit, Aut, Win, Spr (Twiggs)

297. Seminar in Mechanics and Control of Flight—For graduate students with an interest in automatic control applications in flight mechanics, guidance, navigation, and mechanical design of control systems; others invited. Problems in all branches of vehicle control, guidance, and instrumentation presented by researchers on and off campus. Registration for credit optional; letter grade given for students who make presentations. May be repeated for credit. (AU)
1 unit, Aut (Powell)
Win (How)
Spr (Rock)

298. Seminar in Fluid Mechanics—(Enroll in Engineering 298.) May be repeated for credit. (AU)
CHEMICAL ENGINEERING

Emeriti: (Professors) Andreas Acrivos, Michel Boudart
Chair: Gerald G. Fuller
Professors: Curtis W. Frank, Gerald G. Fuller, Alice P. Gast, George M. Homisy, Robert J. Madix, Channing R. Robertson
Associate Professors: Chaitan Khosla, Eric S. G. Shaqfeh
Assistant Professors: Christopher Klug, Charles Musgrave
Consulting Professors: Donald Burland, Wolfgang Knoll, Jaan Noolandi, Conrad Schadt, Robert Schwaar, John Sinfelt

* The curriculum leading to the B.S. degree in Chemistry is described in the "School of Humanities and Sciences" section of this bulletin.

UNDERGRADUATE PROGRAM

BACHELOR OF SCIENCE

The engineering depth sequence required for the B.S. degree (see the "School of Engineering" section of this bulletin) provides a background in the fundamentals of chemistry and basic training in applied chemical kinetics, engineering thermodynamics, plant design, process analysis and control, separation processes, and transport phenomena. The B.S. program in Chemical Engineering additionally requires basic courses in chemistry, engineering, mathematics, and physics.

Otherwise, there is no set B.S. program for Chemical Engineering students to follow. A sample program is available from the department's advisers or the Dean's Office, School of Engineering.

1-15 units, any quarter (Staff)

1-15 units, any quarter (Staff)

308. Spectral Methods in Computational Physics—(Enroll in Mechanical Engineering 308.)

311. System Identification—(Enroll in Engineering 211.)

351A,B,C. Advanced Fluid Mechanics—(Enroll in Mechanical Engineering 351A,B,C.)

366. Introduction to Fourier Optics—(Enroll in Electrical Engineering 366.)

370. Advanced Modern Optics—(Enroll in Electrical Engineering 349.)

GRADUATE PROGRAMS

MASTER OF SCIENCE

An M.S. program comprising an academic year of appropriate course work is available to accommodate students wishing to pursue a professional chemical engineering career after receiving the B.S. degree, including foreign students who plan on returning to their homeland. The M.S. degree is awarded, without requiring a formal thesis, after a minimum of three quarters of broad study subject to the specifications stated below.

Unit and Course Requirements—For students terminating their graduate work with the M.S. degree in Chemical Engineering, a program consisting of 45 units of academic work is required, including at least four lecture courses selected from the Chemical Engineering 200-lecture series. The remaining courses may be chosen from department approved graduate or advanced undergraduate courses in basic or applied sciences and engineering according to the following guidelines. (1) Approved courses include (a) all graduate courses offered in the Departments of Aeronautics and Astronautics, Chemical Engineering, Civil Engineering, Computer Science, Electrical Engineering, Materials Science and Engineering, Mechanical Engineering, Applied Physics, Biological Sciences, Chemistry, Mathematics, Physics, Statistics, and the School of Earth Sciences, and (b) all upper-division undergraduate courses in Biological Sciences, Computer Science (108 and above), Mathematics, Physics, and Statistics. (2) Undergraduate courses in chemical engineering excluding 100, 110, 130, and 180AJB may be included as part of the 45-unit master’s program. Departures must be approved by petition of the student to the chair of the Department of Chemical Engineering. Credit toward the M.S. degree is not given for Chemical Engineering Special Topics courses numbered 270-279, or for the colloquium, 300. Note, however, that the student must register for 300 and attend the colloquia. Students wishing to obtain research experience should choose a research adviser and enroll in Chemical Engineering Research 290; up to 6 units may count toward the 45-unit requirement. 290, however, may not be substituted for any of the required four lecture courses in the Chemical Engineering 200 lecture series. A written report...
Engineering
The degree of Engineer is awarded after completion of six quarters of study beyond the bachelor's degree, plus the requirements listed below. This degree is not required to enter the Ph.D. program.

Unit and Course Requirements—A minimum of 72 total units (including research) and 45 units of course work is required for the Engineer degree, including the following Chemical Engineering courses: 220, 221, 222, 230, 231, and either 232 or 233/234. The remaining courses, to total 45 units, may be chosen from the basic sciences and engineering. After completing this series of courses and at least three quarters of residence (45 units or more of course or research work), the student is eligible to apply for the M.S. degree in Chemical Engineering. Students may participate in a research project during their first year. Following consultation with their adviser, they may register for up to 6 units of chemical engineering research. These research units may be applied toward the 45-unit requirement for the M.S. but may not be applied toward the 45-unit course requirement for the Ph.D. degree. No credit is given for Chemical Engineering 270-279 and 300, undergraduate chemical engineering courses, or courses usually required for the B.S. degree. All courses intended to satisfy the degree requirements must be taken for letter grades, if offered, and a grade point average (GPA) of 3.0 must be maintained.

Thesis Requirement—The thesis must represent a substantial piece of research equivalent to nine months of full-time effort and must be approved by a reading committee consisting of two members of the Chemical Engineering faculty. The thesis must be available in its final form for inspection by the faculty and must have been approved by the Reading Committee at least two weeks prior to the scheduled date of the examination.

DOCTOR OF PHILOSOPHY
The Ph.D. degree is awarded after completion of a minimum of nine quarters of study plus the requirements listed below.

Unit and Course Requirements—A minimum of 72 total units (including research) and 45 units of course work is required for the Ph.D. degree, including the following Chemical Engineering courses: 220, 221, 222, 230, 231, 281, and either 232 or 233. The remaining courses, to total 45 units, may be chosen from the basic sciences and engineering. After completing this series of courses and at least three quarters of residence (45 units or more of course or research work), the student is eligible to apply for the M.S. degree in Chemical Engineering. Students may participate in a research project during their first year. Following consultation with their adviser, they may register for up to 6 units of chemical engineering research. These research units may be applied toward the 45-unit requirement for the M.S. but may not be applied toward the 45-unit course requirement for the Ph.D. degree. No credit is given for Chemical Engineering 270-279 and 300, undergraduate chemical engineering courses, or courses usually required for the B.S. degree. All courses intended to satisfy the degree requirements must be taken for letter grades, if offered, and a grade point average (GPA) of 3.0 must be maintained.

Teaching Requirement—All Ph.D. candidates, regardless of the source of their financial support, are required to gain teaching experience as an integral part of graduate training in the Department of Chemical Engineering.

Qualifying Examination—To be advanced to candidacy for the Ph.D. degree, the student must pass a preliminary qualifying examination. First-year students are asked to present orally and defend a critical review of a published paper before the faculty at the beginning of the Spring Quarter. This examination is used to decide whether or not these students will be allowed to choose research advisers and begin thesis research in the Spring Quarter of their first year. Failing this examination leads to termination of the student's study with an M.S. degree and precludes financial aid beyond that already promised. Students passing this preliminary examination take a qualifying examination consisting of an oral defense of their research work before the faculty early in the Autumn Quarter of their second year.

Dissertation Requirement—A dissertation based on a successful investigation of a fundamental problem in chemical engineering is required: the student enrolls in Chemical Engineering 290.
during the course of this research. In four calendar years after enrolling in the department, the student is expected to have fulfilled all the requirements for the Ph.D. including submission of a completed dissertation that has already been approved by his or her research adviser to the reading committee. No sooner than four weeks after this date, the student’s University oral examination is scheduled. This exam, based on the candidate’s dissertation research, is in the form of a public seminar followed by private questioning by an examining faculty committee. After satisfactory performance in the examination and submission of the dissertation to the Degree Progress office of the Registrar’s Office, the Ph.D. degree is awarded.

RESEARCH ACTIVITIES

Research investigations are currently being carried out in the following fields: applied statistical mechanics, biocatalysis, bioengineering, catalysis, colloidal science, computational materials science, hydrodynamic stability, kinetics and catalysis, Newtonian and non-Newtonian fluid mechanics, polymer science, rheo-optics of polymeric systems, and surface and interface science. A brochure describing research projects currently being pursued in these areas is available from the department upon request.

FELLOWSHIPS AND ASSISTANTSHIPS

A number of fellowships and assistantships are awarded each year to incoming students. Application forms may be obtained from the department. The completed application should be received no later than January 1 preceding the start of the academic year for which the award is to be made.

COURSES

(WIM) indicates that the course is subject to the University Activity Unit limitations (8 units maximum).

PRIMARILY FOR UNDERGRADUATES

20. Introduction to Chemical Engineering—
(Enroll in Engineering 20.)
3 units, Spr (Fuller)

3 units, Aut (Homsy)

110. Equilibrium Thermodynamics—Thermodynamic properties, equations of state, properties of non-ideal systems including mixtures, and phase and chemical equilibria. Prerequisite: Chemistry 171.
3 units, Win (Madix)

120. Separation Processes—Analysis and design of equilibrium and non-equilibrium separation processes. Possible examples: distillation, liquid-liquid extraction, electrophoresis, centrifugation, chromatography, and reaction-assisted separation processes.
3 units, Spr (Musgrave)

130. Kinetics and Reactor Design—Chemical kinetics, elementary steps, mechanisms, rate-limiting steps, and the quasi-steady state approximations. Ideal isothermal and non-isothermal reactors; design principles. Multiplicity, ignition, and extinction in stirred tank reactors; limitations of thermodynamic equilibrium. Departures from ideality; residence time distributions, dispersion in fixed beds, mass transfer limitations. Prerequisites: 110, 140, 150; Chemistry 171, 173.
3 units, Win (Gast)

140. Fluid Mechanics—The flow of isothermal fluids from a momentum transport viewpoint. Continuum hypothesis, scalar fields, fluid statics, deformation of continuous media, non-Newtonian fluids, the equations of motion, creeping and potential flow, boundary layer theory, turbulence, free-surface phenomena, porous media flows. Prerequisites: junior standing in chemical engineering or consent of instructor; 100 and Math. 130, or equivalent.
4 units, Win (Robertson)

150. Energy and Mass Transport—The transport of energy and mass in solid and fluid continua. Fourier’s law, heat transfer in solids, laminar flow, forced and free convection, boundary-layer heat transfer, natural convection with application to geophysical flows, energy transport by radiation, Fick’s Law, binary diffusion, the equation of convective diffusion, mass transfer with chemical reaction, transport in turbulent flows, heat and mass transfer analogies. Prerequisite: 140 or equivalent.
4 units, Spr (Fuller)

160. Chemical Engineering Plant Design—Open to seniors in chemical engineering or by consent of instructor. Application of chemical engineering principles to design of practical plants for manufacture of chemicals and related materials. Topics: flowsheet development from a conceptual design, equipment design for distillation, chemical reactions, heat transfer, pumping, and compression; estima-
tion of capital expenditures and production costs; plant construction.

3 units, Spr (Pavone)

170. Polymer Science and Engineering—Introduction to the physical aspects of polymer science, including morphology of amorphous and semicrystalline polymers, linear viscoelasticity and rheology with emphasis on typical processing methods. Selected applications of polymers in microelectronics.

3 units, Win (Frank)

180A,B. Chemical Engineering Laboratory—Investigation of experimental aspects of chemical engineering science, emphasizing development of communications skills. Experiments illustrating lecture subjects conducted by groups of students. Lab. (WIM)

180A. 3 units, Aut (Frank)
180B. 3 units, Win (Klug)

190. Undergraduate Research in Chemical Engineering—Lab or theoretical work for undergraduate students under the direct supervision of a faculty member. Research in one of the graduate research groups or other special projects in the undergraduate chemical engineering lab. Students should consult advisers for information on available projects.

(Staff)

PRIMARILY FOR GRADUATE STUDENTS


3 units, Aut (Homsky)


3 units, Win (Shaqfeh)

222. Transport Phenomena II—Continuation of 221 emphasizing boundary layer phenomena, heat and mass transport, transport with chemical reaction, and reaction-diffusion systems. High Reynolds number flows; boundary layers, vorticity layers. Transport for low and high Peclet numbers in unbounded flows; transport in tubes, Leveque approximations; applications in membrane transport; transport in flows with closed streamlines, drops, bubbles, and interphase transport. Prerequisite: 221.

3 units, Spr (Shaqfeh)

223. Microrheology—Flow phenomena of polymeric and colloidal liquids; fundamental concepts of rheology; measurement techniques in rheometry; molecular models of dilute and concentrated polymer solution dynamics (flexible and rigid macromolecules); prediction of rheo-optical properties from molecular models; dynamics of colloidal suspensions.

3 units (Staff) given 1998-99


3 units (Fuller) given 1998-99


3 units, Aut (Klug)

231. Structure and Spectroscopy of Molecular Systems—For graduate students in all engineering and science disciplines with an interest in spectroscopic studies of the gas and condensed phases. Photon and electron spectroscopies of the gas and solid phases. Infrared, electron energy loss, and Raman vibrational spectroscopies. Auger, x-ray and ultraviolet photoelectron spectroscopies. Synchrotron spectroscopy methods, including near edge absorption fine structure and extended x-ray, absorption fine structure analysis. Basic nuclear magnetic resonance spectroscopy.

3 units, Win (Madix)

232. Protein Science and Engineering—Emphasis on physico-chemical interactions that govern structure and function of proteins. Topics: protein function and structure, techniques for probing protein structure and function, mechanisms of protein function, design of proteins with novel properties. Examples from literature on enzymes. Recommended: background in physical and organic chemistry.

3 units, Aut (Khosla)
233. Polymer Physics—Emphasis on statistical analysis of the molecular structure of high polymers. Topics: spatial configuration of the isolated polymer chain; morphology in amorphous and semicrystalline polymers, polymer blends, liquid crystal polymers; rubber elasticity. Recommended: one introductory course in statistical thermodynamics. 3 units, Spr (Frank)

236. Colloid and Interface Science—The fundamental physics and chemistry of the solid-liquid interface. The intermolecular, electrostatic, van der Waals polymeric, and solvation forces governing colloidal behavior. Surface phenomena (wetting, spreading of thin films, and adsorption of macromolecules). Association colloids (micelles and microemulsions). Colloidal phase behavior and aggregation. 3 units, Spr (Gast)

237. Introduction to Biotechnology—(Same as Biochemistry 237, Biological Sciences 237, Civil Engineering 237, Developmental Biology 237, Structural Biology 237.) Faculty from the Departments of Biochemistry, Biological Sciences, Chemical Engineering, Civil Engineering, Developmental Biology, Structural Biology, and invited industrial speakers review the interrelated elements of modern biotechnology. Topics: protein structure and dynamics, protein engineering, biocatalysis, gene expression, cellular metabolism and metabolic engineering, fermentation technology, and purification of biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences or engineering. 3 units (Robertson) given 1998-99

270-280. Special Topics in Chemical Engineering—Discussion of recent developments and current research in specialized fields. Units by arrangement. Prerequisite: consent of instructor. Aut, Win, Spr

270A,B,C. Biocatalysis (Khosla)
271A,B,C. Computational Materials Science (Musgrave)
273A,B,C. Bioengineering (Robertson)
274A,B,C. Microrheology (Fuller)
275A,B,C. Surface and Interface Science (Madix)
276A,B,C. Polymer Physics (Frank)
277A,B,C. Stability of Fluid Motions (Homsy)
278A,B,C. Statistical Mechanics of Dispersed Systems (Gast)
279A,B,C. Transport Mechanics (Shaqfeh)
280A,B,C. NMR of Solids (Klug)

281A,B. Introduction to Chemical Engineering Research—Students take part in one-quarter research projects in two groups in department: lab, library, or theoretical research projects are under guidance of faculty member. Findings are reported in poster session for entire department at end of quarter with written report to adviser. 0-3 units, Aut, Win (Staff)

290. Graduate Research in Chemical Engineering—Lab and theoretical work for graduate students on chemical engineering problems leading to partial fulfillment of requirements for an advanced degree. Credit is given after the student has satisfied the specific report or dissertation requirement. (Staff)

300. Colloquium—Students attend the colloquia of the Department of Chemical Engineering. Must be taken every quarter by candidates for advanced degrees in Chemical Engineering. (AU) 1 unit, Aut, Win, Spr (Staff)

CIVIL AND ENVIRONMENTAL ENGINEERING


Chair: Jeffrey R. Koseff


Associate Professors: Ronaldo I. Borja, David L. Freyberg, Lynn M. Hildemann (on leave Spring), Stephen G. Monismith, H. Allison Smith (on leave 1997-98)

Assistant Professors: Martin Fischer, Mark Z. Jacobson, Alfred M. Spormann

Professors (Research): C. Allin Cornell, Martin Reinhard, Paul M. Teicholz

Professor (Teaching): Gilbert M. Masters

Courtesy Professors: Joel H. Feziger, Thomas J. R. Hughes, Robert E. McGinn (Teaching), Peter M. Pinsky, Stephen H. Schneider, George S. Springer

Consulting Professors: John A. Blume, Roger D. Borchert, Ralph T. Cheng, Robert E. Clark, James E. Cloern, Russell G. Clough, Weimin Dong, Angelos N. Findikakis, Alan D. Jassby, Michael C. Kavanaugh, Francis L. Ludwig, Billy Martin, W. Mike Martin, Martin W. Mc-
The undergraduate curriculum provides a pre-professional program balancing the fundamentals common to many special fields of civil engineering with specialization in Environmental and Water Studies or Structures and Construction. Laboratory facilities are available to students in construction, fluid mechanics, environmental engineering and science, structural and earthquake engineering, building energy, and experimental stress analysis.

At least one year of graduate study is strongly recommended for professional practice. Students who contemplate advanced study at Stanford should discuss their plans with their advisers in the junior or senior year. The coterminal B.S.-M.S. program should be considered by students who want an integrated five-year program. Potential coterminal students in Environmental Engineering and Science should be aware that applications are considered once a year, near the beginning of Winter Quarter.

The Department of Civil and Environmental Engineering (CEE), in collaboration with other departments of the University, offers graduate degree programs in:

- Construction Engineering and Management
- Environmental and Water Studies
  - Environmental Engineering and Science
  - Environmental Fluid Mechanics and Hydrology
- Structural Engineering and Geomechanics
  - Geomechanics
  - Structural Engineering

Research work and instruction under these programs are carried out in the following facilities: Building Energy Laboratory, Environmental Fluid Mechanics Laboratory (EFML), Soil Mechanics Laboratory, Structural Engineering Laboratory, and water quality control research and teaching laboratories. Research in earthquake engineering is conducted in the John A. Blume Earthquake Engineering Center. Research on control of hazardous substances is coordinated within the Western Region Hazardous Substance Research Center.

In collaboration with the Department of Computer Science, the Center for Integrated Facility Engineering (CIFE) employs advanced CAD, information management, artificial intelligence, and communications concepts to integrate the presently fragmented participants in the facility development process and to support design and construction automation. CIFE is stimulating significant new research and educational activities in the two departments.

**PROGRAMS OF STUDY**

**CONSTRUCTION**

The Construction Engineering and Management program prepares technically qualified students for responsible management roles in all phases of the development of major constructed facilities. It emphasizes management techniques useful in planning, coordinating, and controlling the activities of diverse specialists (designers, contractors, subcontractors, and client representatives) within the unique project environment of the construction industry. In addition, the program offers subjects that focus on engineering aspects of heavy, industrial, and building construction. By appropriate choice of elective subjects, students wishing to work for a contractor, design firm, construction management consultant, or the facilities department of an owner’s organization can design a program for their needs.

The construction curriculum includes core courses, construction engineering electives and construction management electives. (Subjects offered include estimating, productivity improvement, equipment and methods, planning and control techniques, managing human resources, construction administration, project and company organizations, computer applications, building systems, construction finance and accounting, international construction, real estate development, and labor relations.) Additional related course work is available from other programs within the department, from other engineering departments, and from other schools in the University such as Earth Sciences and the Graduate School of Business.

The program leads to the degrees of Master of Science (M.S.), Engineer, and Ph.D. Students with undergraduate degrees in chemical, electrical, mechanical, mining, and petroleum engineering, or in architecture who do not wish to satisfy the undergraduate prerequisite courses for the M.S. in Civil and Environmental Engineering—Construction Engineering and Management have the option of meeting the same graduate course requirements as the above and obtaining the M.S. in Engineering—Construction Engineering and Management. A limited number of M.S.-level graduate students and most Ph.D. candidates are supported each year through the sponsored research and teaching activities and through industry-sponsored fellowships.
The Construction Program faculty and students are active participants in the Center for Integrated Facility Engineering (CIFE). CIFE conducts research on automation, integration, and management of technology.

The program maintains close ties with the construction industry through the Stanford Construction Institute. Students participate in weekly discussions with visiting lecturers from all sectors of the U.S. construction industry.

ENVIRONMENTAL AND WATER STUDIES

This program covers a broad spectrum of specialties, including environmental engineering and science, environmental fluid mechanics, hydrology, and environmental planning. Course offerings are scheduled to permit either intensive study in a single area or interrelated study between areas. Seminars provide a broad coverage of environmental problems. The programs are kept flexible to foster interaction among students and to encourage the development of individual programs suitable for a broad range of engineering and science backgrounds and career goals. The Stanford laboratories for water quality control and environmental fluid mechanics are well equipped and instrumented for advanced research and instruction.

Students with backgrounds in all areas of engineering and science who are interested in applying their specialized abilities to solving environmental and water problems are welcome. Comprehensive introductory courses in each major area of study are given to provide common understanding among those with dissimilar backgrounds. Courses from many other programs and departments both complement and supplement these course offerings. Some examples include Computer Science (numerical methods), Environmental Engineering and Science (chemical and microbiological processes), Geological and Environmental Sciences (hydrogeology, geostatistics), Mechanical Engineering (applied math, fluid mechanics, heat transfer, experimental methods), Petroleum Engineering (reservoir engineering, well-test analysis), and Statistics (probability and statistics). The major areas of specialization in the two programs, environmental engineering and science, and environmental fluid mechanics and hydrology, are described below.

The Environmental Engineering and Science Program emphasizes water quality, but also encompasses other environmental areas and the broader aspects of pollution treatment and control issues. Course offerings include the biological, chemical, and engineering aspects of water supply, water and air pollution, hazardous substance control, and the fate and effects of pollutants in surface and groundwaters, soil, and the atmosphere. Companion courses in the Environmental Fluid Mechanics and Hydrology Program include environmental planning and impact assessment, as well as hydrology, environmental fluid mechanics, and transport modeling. Research on hazardous substances is coordinated through the Western Region Hazardous Substance Research Center. The objective of this center, sponsored by the U.S. Environmental Protection Agency, is to promote through fundamental and applied research the development of alternative and advanced physical, chemical, and biological processes for the treatment of hazardous substances in the environment, with emphasis on groundwater contamination.

The Environmental Fluid Mechanics and Hydrology Program focuses on developing an understanding of the physical processes controlling the movement of mass, energy, and momentum in the water environment and the atmosphere. The program also considers environmental and institutional issues involved in planning water resources development projects. Environmental fluid mechanics courses address fluid transport and mixing processes; turbulence and its modeling; the fluid mechanics of stratified flows; natural flows in coastal waters, estuaries, lakes, and open channels; and experimental methods. Hydrology courses consider stochastic methods in both surface and subsurface hydrology, watershed hydrology and modeling, and flow and transport in porous media. Planning courses emphasize environmental policy implementation and sustainable water resources development.

STRUCTURAL ENGINEERING AND GEOMECHANICS

Structural engineering at Stanford encompasses teaching and research programs in earthquake engineering and structural dynamics, risk and reliability analysis, structural analysis and design, computer-aided engineering, and computational mechanics. The programs are designed to provide a broad knowledge in these fields and to prepare students for industrial or academic careers. Academic programs can be designed to meet the needs of students wishing to launch careers as engineering analysts, designers, and consultants on large and small projects. Students have the opportunity to balance strong engineering fundamentals with modern computational methods.

Course work in earthquake engineering and structural dynamics provides an understanding of the earthquake phenomenon, the resulting ground shaking, and in-depth knowledge on the behavior, analysis, and design of various types of structures under seismic or other dynamic forces. Automated structural control systems and devices, and the utilization of advanced materials for civil infrastructures and seismic retrofits are part of the
ongoing research activities. Advanced analytical and experimental research in earthquake engineering is conducted at the John A. Blume Earthquake Engineering Center, which houses static and dynamic testing equipment including two shaking tables.

Reliability and risk analysis focuses on instruction and research in advanced methods for structural safety evaluation and design, including methods for loss estimation from damage and failures of structures and lifeline systems. Course work combines a strong background in structural analysis and design with probability theory and statistics. Research in this area deals with seismic risk and reliability of large structural systems, wind hazards, regional loss and damage evaluation, and reliability of marine systems.

Courses and research in structural analysis and design focus on the conceptual and detailed design of structural systems and on computational methods for predicting the static and dynamic, linear and non-linear response of structures. Included are courses that emphasize earthquake resistant design and computer-based design concepts. Related course work is available from other departments such as mechanical engineering, materials science and engineering, and computer science. In collaboration with CIFE, issues involving design for constructibility and collaborative engineering are addressed as an integral part of the research.

Computational mechanics emphasizes the application of modern computing methods to structural engineering and geomechanics. It draws on the disciplines of computer science, mathematics, and mechanics, and encompasses numerical structural and geotechnical analysis, including finite element analysis and boundary element methods. There is collaborative research in bio-engineering with the Medical School and high performance computing with the Scientific Computing and Computational Mathematics Program.

Students with primary interests in the application of the principles of applied mechanics to problems involving geologic materials have the option of enrolling in a degree program in geomechanics. This program focuses on instruction and research in theoretical soil and rock mechanics, computational methods, and analysis and design of foundations and earth structures. In addition to the program's offerings, related courses are available in structural engineering, construction engineering, earth sciences, and the water resources program.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

Students who major in civil and environmental engineering must complete the requirements for the B.S. degree listed under Undergraduate Programs in the "School of Engineering" section of this bulletin. Elective units may be used in any way the student desires, including additional studies in civil and environmental engineering. Because the undergraduate engineering curriculum is designed to ensure breadth of study, students who intend to enter the professional practice of civil engineering should plan to obtain their professional education at the graduate level.

For information about a CEE minor, see the "School of Engineering" section of this bulletin.

HONORS PROGRAM

This program leads to a B.S. with Honors in Civil and Environmental Engineering. It is designed to encourage highly qualified students to undertake a more intensive study of civil and environmental engineering than is required for the normal major, with courses and research work of high distinction.

The program involves an in-depth research study in an area proposed to and agreed to by a Department of Civil and Environmental Engineering (CEE) faculty adviser and completion of a thesis of high quality. A written proposal for the research to be undertaken must be submitted and approved in the fourth quarter prior to graduation. At the time of application, the student must have a grade point average (GPA) of at least 3.5 for course work at Stanford and this grade record must be maintained to graduation. The thesis is supervised by a CEE faculty adviser and must involve input from the School of Engineering Writing Program by means of Engineering 102S or its equivalent. Students are encouraged to present their results in a seminar for faculty and other students. Up to 10 units of CEE 199, Directed Reading and Special Studies in Civil and Environmental Engineering, may be taken to support the research and writing (not to duplicate Engineering 102S). These units are beyond the normal civil and environmental engineering program requirements.

GRADUATE PROGRAMS

Admission—Applications require submission of the application form, statement of purpose, three letters of recommendation, results of the General Section of the Graduate Record Examination, and transcripts of courses taken at colleges and universities. Policies for each of the department's programs are available from the Department of Civil and Environmental Engineering. Successful applicants are advised as to the degree and program for which they are admitted. If students wish to shift from one program to another after being accepted, an application for transfer must be filed with the department, and they are advised if the transfer is possible. If, after enrollment at
of graduate study after the M.S. degree. Programs are offered in the fields of specialization mentioned for the M.S. degree.

DOCTOR OF PHILOSOPHY

The Ph.D. is offered under the general regulations of the University as set forth in the "Graduate Degrees" section of this bulletin. This degree is recommended for those who expect to engage in a professional career in research, teaching, or technical work of an advanced nature. The Ph.D. program is rigorous and should be undertaken only by students with ability for independent work. It requires a minimum of three years (nine quarters) of graduate study, at least two years of which must be at Stanford. Experience has shown that few students complete the Ph.D. within the minimum residence period. Prospective doctoral students should anticipate the possibility of at least one extra year. All candidates for the Ph.D. degree are required to complete the equivalent of one 50 percent time teaching assistantship for one quarter. Further information about Ph.D. requirements and regulations is found in the department handbook.

The first year of graduate study can be represented by the M.S. program described above. The second year is devoted partly to additional graduate courses and partly to preliminary work toward a dissertation. The third and subsequent years are applied to further course work and to the completion of an acceptable dissertation.

The program of study is arranged by the prospective candidate at the beginning of the second year with the advice of a faculty committee whose members are nearest in the field of interest to that of the student. The chair of the committee serves as the student's pro tem adviser until such time as a member of the faculty has agreed to direct the dissertation research. Insofar as possible, the program of study is adapted to the interests and needs of the student within the framework of the requirements of the department and the University. In the second year of graduate study, the student is expected to pass the department's General Qualifying Examination to be admitted to candidacy. After completing their research, students are required to pass the University oral examination, which is a dissertation defense.

Ph.D. MINOR

A Ph.D. minor is a program outside a major department. A minor is not a requirement for any degree, but is available when agreed on by the student and the major and minor departments. Requirements for a minor are established by the minor department. Acceptance of the minor as part of the total Ph.D. program is determined by the major department. Application for candidacy must be approved by both the major and the minor department, and the minor department must be represented at the University oral examination.
A student desiring a Ph.D. minor in Civil and Environmental Engineering (CEE) must have a minor program adviser who is a regular CEE faculty member in the program of the designated subfield. This adviser must be a member of the student's University oral examination committee and the reading committee for the dissertation.

The program must include at least 20 units of graduate-level course work (that is, courses numbered 200 or above, excluding special studies and thesis) in CEE completed at Stanford University. The list of courses must form a coherent program and must be approved by the minor program adviser and the CEE chair. An average GPA of at least 3.0 must be achieved in these courses.

FINANCIAL ASSISTANCE

The department maintains a large and continuing program of financial aid for graduate students. Applications for financial aid and assistantships should be filed by January 1; it is important that Graduate Record Examination scores be available at that time.

Teaching assistantships carry stipends for as much as one-half time work to assist with course offerings during the academic year. Research assistantships also are available. Engineer and Ph.D. candidates may be able to use research results as a basis for the thesis or dissertation. Assistantships and other basic support may be supplemented by fellowship and scholarship awards or loans. Continued support is generally provided for further study toward the Engineer or Ph.D. degree based on the student's performance, the availability of research funds, and requisite staffing of current projects.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

UNDERGRADUATE

60Q. Stanford Introductory Seminar: Physical Oceanography of California—Preference to sophomores. Introduction to physical oceanography focusing on themes relevant to California's environment. The core studies physical systems that function at different spatial and temporal scales and illustrate different hydrodynamic phenomena: upwelling flows adjacent to the central California coast, tidal motions in San Francisco Bay, and a wave swept beach. Emphasis is on applying mathematical tools to the analysis of physical systems (how those tools are used to quantify physical systems), and to make predictions about their behavior. Enrollment limited to four. Prerequisites: Math. 43, Physics 41.
5 units, Spr (Monismith)

100. Managing Civil Engineering Projects—Introduction to the facility life cycle and project delivery process and organization. Techniques for planning, organizing, and executing civil engineering projects from conception to completion. Project objectives (scope, quality, cost, time, and safety) from multiple perspectives throughout the facility life cycle. Time and cost planning and control, including scheduling and cost estimating techniques using information technology. Small team projects, exposure to real world projects, and individual paper. (WIM)
4 units, Aut (Fischer)

101A. Structural Systems—Structural loads in design, structural systems, serviceability and deflections, safety against failures, examples of failures, energy methods, soil classification, soil and site improvement, computers and structures, concepts in computer aided engineering. Lab experiments and field trips. Prerequisites: 100, Engineering 14.
4 units, Win (King)

101B. Mechanics of Fluids—Physical properties of fluids and their effect on flow behavior; equations of motion for incompressible ideal flow, including the special case of hydrostatics; continuity, energy, and momentum principles; control volume analysis; laminar and turbulent flows; internal and external flows in specific engineering applications including pipes, open channels, wind turbines, airplane wings, and baseballs. Prerequisites: 101A, Math. 43.
4 units, Spr (Street)

4 units, Aut (Borja)

102. Legal Context of Civil Engineering—Introduction to the U.S. legal system as it applies to civil engineering and construction. Fundamental concepts of contract and tort law, claims, risk management, business formation and licensing, agency, insurance and bonding, and real property.
3 units, Win (London)

110. Analysis and Numerical Modeling of Civil Engineering Systems—Development of a working knowledge of analytical and numerical techniques needed to solve a range of problems in civil engineering. Application of the techniques to specific problems in civil engineering systems. Governing equations plus appropriate boundary and/or initial conditions derived from the physical contexts. Application of ordinary differential equation methods. Introduction to: partial differential equation models of physical phenomena and solution of
the models, linear algebra and its application, modeling of systems with uncertain inputs and data, role of probability. Prerequisites: 101B, 170, Mechanical Engineering 100.

4 units, Aut (Street)

114. Symbolic Modeling in Engineering—Issues concerning symbolic model-based reasoning systems in engineering. Lab course to study and create symbolic models using artificial intelligence representation and reasoning techniques, and engineering principles and heuristics. Prerequisite: Computer Science 106A or equivalent.

4 units, Aut (Kunz)

122A. Computer Integrated Architecture/Engineering/Construction (A/E/C)—Undergraduates serve as apprentices in 222A. See 222A. Enrollment limited and based on interviews.

2 units, Win (Fruchter)

122B. Computer Integrated Architecture/Engineering/Construction (A/E/C)—Undergraduates serve as apprentices in 222B. See 222B. Enrollment limited and based on interviews.

2 units, Spr (Fruchter)

140. Construction Surveying—Introduction to basic field surveying methods, emphasizing construction related activities. Use of optical level, theodolite, EDM, total station. Field activities include level loops, traverses, construction layout, and as-built measurements. Introduction to advanced measurement and positioning technologies. Lab.

3 units, Spr (Staff)

141. Design and Construction of Concrete Canoe for ASCE Competition—Design, construction, and testing of canoe; structural and hydrodynamic analysis; selection of materials and construction methods; participation in regional canoe race.

1 unit, Aut, Win, Spr (Staff)

142. Project and Company Organizations—Graduate students register for 242; see 242.

3 units, Win (Levitt)

146. Managing Engineering and Construction Companies—Graduate students register for 246; see 246.

3-4 units, Spr (Levitt)

147. Cases in Management and Leadership—(Graduate students register for 247.) Case discussions regarding the management of construction projects. Emphasis is on the understanding of personalities, thinking styles, and negotiation skills. Cases are based on the instructor's 30 years of experience in the construction industry. Field trips to local projects augment the cases.

3 units, Win (Clough)

153. Construction Equipment and Methods—(Graduate students register for 253.) Methods to build projects planned by engineers and architects. Application of engineering fundamentals to the selection and design of equipment and systems to carry out production operations in construction; analysis of production output and costs; operations simulation; application of engineering economy to equipment and process decision making. Prerequisites: 100; Engineering 14, 60.

3 units, Win (Staff)

154. Construction Cost Estimating—(Graduate students register for 254.) Application of specific construction methods using case studies, cost estimating, and field trips. Emphasis is on the fundamental driving forces in the industry through the practice of estimating infrastructure costs. Class discussions are based on the instructor's 30 years in the construction business and five required field trips. Students are graded on competitive cost estimates and presentations based on the field trips.

3 units, Spr (Clough)

156. Building Systems Design—(Graduate students register for 256.) Design concepts, materials of construction, and installation operations for conventional building systems. Lectures and group projects on heating, ventilation, and air conditioning (HVAC) systems; and building electrical systems. Student groups analyze selected building systems on active projects, and report on existing design, a redesigned portion of system, materials of construction, and installation.

4 units, Win (Tatum)

158. Professional Development Seminar—Weekly presentations by industry professionals on topics relevant to students planning to enter the civil engineering profession. Environmental, structural, construction, and development perspectives. (AU)

1 unit, Win (Tatum)

160. Mechanics of Fluids Laboratory—Lab experiments/demonstrations illustrate conservation principles and flows of real fluids. Corequisite: 101B.

2 units, Spr (Street)

161. Open Channel and Pipe Flows—Steady flows in engineered and natural channels and rivers and pipe systems. Basic equations and theory (mass, momentum, and energy equations). Application of theory to design of flood-control and water supply systems. Lab experiments illustrate concepts developed in class. Prerequisites: 101B, 160.

4 units, Aut (Koseff)

162. Hydrology and Water Resources—Introduction to hydrologic processes, including precipitation, evapotranspiration, snowmelt, infiltration, soil moisture, groundwater flow, runoff, and streamflow. Reservoir and channel routing, watershed models, and statistical tools. Water as a resource: irrigation, hydroelectric power generation, urban water systems, water quality control processes, groundwater development, water law and
institutions. Required field trips. Prerequisites: 161, 163, 170, Engineering 60.

4 units, Win (Freyberg)

163. Meteorology and the Atmospheric Environment—Introduction to meteorology and its effects on air pollution. Structure and composition of the atmosphere; pressure, temperature, and humidity; condensation; stability; aerosol, fog, and cloud formation; light, color, and atmospheric optics; radiative transfer and radiation balance; forces and local winds; pollutant transformation and transport; high and low pressure systems; westerlies, jet streams, and other global scale winds; El Niño and atmosphere-ocean interactions, air masses, fronts, cyclones, thunderstorms, tornadoes, and hurricanes. Prerequisites: Math. 43 and Physics 41 or equivalents, or consent of instructor.

3 units, Aut (Jacobson)

169. Environmental and Water Studies: Design—Seniors in civil and environmental engineering only. The design of water resources systems. Design as a process. Application of fluid mechanics, hydrology, water resources, environmental science, planning, and engineering economy fundamentals to the design of systems, addressing a complex problem of water in the natural and constructed environment. Problem varies each year, e.g., remediation of a contaminated groundwater site, rehabilitation and expansion of an urban water supply system, management and reduction of risk in a floodplain, management of urban stormwater. Student design groups. Prerequisite: 162.

5 units, Spr (Freyberg)

170. Environmental Science and Technology—For science and nonscience majors. Introduction to the causes, effects, and methods of controlling environmental degradation associated with air and water pollution. Global climate change, stratospheric ozone depletion, regional and urban air pollution; water supply and water quality, risk assessment, and hazardous waste management. GER:2b (DR:6)

3 units, Aut (Masters)

171. Environmental Planning Methods—For juniors and seniors. Use of microeconomics and mathematical optimization theory in design of environmental regulatory programs; tradeoffs between equity and efficiency in designing regulations; procedures for estimating monetary benefits of environmental improvement; techniques for predicting visual, noise, and traffic impacts in environmental impact assessments. Prerequisites: 170, Math. 43. Recommended: Economics 1, 51.

3 units, Win (Ortolano)

172. Air Quality Management—Quantitative introduction to engineering methods used to study and seek solutions to current air quality problems. Topics: global atmospheric changes, urban sources of air pollution, indoor air quality problems, design and efficiencies of pollution control devices, and engineering strategies for managing air quality. Prerequisites: 170, Math. 43. Recommended: 110. 3 units, Win (Hildemann)

174. Ethical Issues in Civil Engineering—(Fulfills the School of Engineering's Technology in Society Requirement.) Seminar on ethical issues and conflicts in civil engineering practice, including environmental, construction, and structural engineering. Analysis of value-laden components of civil engineering work (e.g., environmental impact assessment and air/water pollution, toxic dump cleanup, and building safety standard settings). Ethical dimensions of the siting, design, and construction of structures (e.g., dams, bridges, hotels) and infrastructure components. Exploration of environmental justice conflicts and ethical issues associated with civil engineering work in foreign countries. Real-life case studies. Guest practitioners. Limited enrollment. GER:3b (DR:8)

3-4 units, Spr (McGinn)

not given 1998-99

175. Environmental and Natural Resource Economics—(Enroll in Economics 155, Earth Systems 112.)

5 units, Spr (Goulder)


4 units, Win (Masters)

176B. Electric Power: Generation and Conservation—Electric utility systems: generation, transmission, distribution, regulation; the role of demand-side management and independent power producers. Basic electromechanics: motors, generators; plug loads; power quality. Photovoltaic system analysis and design. Lab. Prerequisite: 176A.

4 units, Spr (Masters)

180A. Introduction to Structural Analysis—Energy principles and virtual work; analysis of indeterminate beams; columns; deflections by moment-area; deflections by energy methods and virtual work; advanced topics in stress and strain including plane stress and strain, and principal stresses; analysis of inelastic and nonlinear beams. Prerequisites: 101A, Engineering 14.

3 units, Spr (King)

180B. Structural Analysis—Analysis of beams, trusses, frames; method of indeterminate analysis by consistent displacement, least work, superposition equations, moment distribution. Introduction to matrix methods and computer methods of structural analysis. Prerequisite: 180A.

4 units, Aut (Kiremidjian)
181. Design of Steel Structures—Concepts of design of steel structures with load and resistance factor design (LRFD) approach; types of loading; structural systems; design of tension members, compression members, beams, beam-columns, and connections; and design of trusses and frames. Comprehensive project on the structural design of an industrial building. Prerequisite: 180A.

4 units, Win (Law)

182. Design of Reinforced Concrete Structures—Properties of concrete and reinforcing steel; behavior of structural elements subject to bending moments, shear forces, torsion, axial loads, and combined actions; design of beams, slabs, columns and footings; strength design and serviceability requirements; design of simple structural systems for buildings. Comprehensive project on the structural design of a reinforced concrete office building. Prerequisite: 180A.

4 units, Spr (Krawinkler)

195. Structural Geology and Rock Mechanics—(Same as Geological and Environmental Sciences 111.) Observational techniques, analysis methods, and theoretical foundations of structural geology, engineering geology, and rock mechanics. Computer exercises are integrated with field data to understand the role of geologic structures in the evolution of the earth's crust (folding, faulting, flow, and fracturing of rock) and geologic hazards (earthquakes, landslides, and volcanoes). Topics: structural quantities and dimensional analysis; use of stress, strain, displacement, and velocity fields in structural analysis; the concept and measurement of deformation; mechanical properties of rock (elasticity, viscosity, strength, friction, fracture toughness); case studies of typical geologic structures using continuum mechanics. Computer labs. Prerequisites: Geological and Environmental Sciences 1, calculus, Macintosh skills.

4 units, Aut (Pollard)

196. Engineering Geology Practice—(Same as Geological and Environmental Sciences 115.) The application of geologic fundamentals to the planning and design of civil engineering projects. Emphasis is on development of geologic skills to identify, describe, and map earth materials and geologic structures as a means of determining the impact on site development. Topics: weathering and soil-forming processes, soil and rock mechanics, site investigation techniques, surface and ground-water regimes, stream and coastal processes, quaternary tectonics, deposits and geomorphology, environmental concerns, and geologic and geotechnical hazards. Field/lab exercises and case history studies emphasize the impact of site geology on the safe planning, design, and construction of civil engineering projects such as foundations, transportation facilities, excavations, tunnels and underground storage space, water supply facilities, and marine works. Prerequisite: 195 or consent of instructor.

3 units (Holzer)

alternate years, given 1998-99

199. Directed Reading or Special Studies in Civil Engineering—Practice in execution of an engineering investigation; preparation of a written report on the investigation. Student must obtain a faculty sponsor.

1 or more units, any quarter (Staff)

PRIMARILY FOR GRADUATE STUDENTS

202. Applied Measurements—Topics related to research or industrial measurements as applied and related to getting valid experimental data. System and instrument specifications, signal conditioning, noise reduction, digital data acquisition, and specific measurements related to motion and acceleration. Recommended: understanding of the concept of frequency response.

1 unit, Aut (Schiff)

203. Statistical Models in Civil Engineering—Introduction to probability modeling and statistical analysis within various areas of civil engineering. Emphasis is on practical issues of model selection, interpretation, and calibration from limited data. Recognition of intrinsic randomness and modeling uncertainty. Introduction to probability event and decision trees. Models of independent events; hazard rate models. Computational methods include Monte-Carlo simulation, and second-moment and full-distribution methods derived from structural reliability theory.

4 units, Aut (Winterstein)

204. Structural Reliability—Probability models for loads and resistance, definition of failure events of structural components and systems, sources and estimation of uncertainties, first- and second-order reliability methods, simulation methods in reliability analysis, solution techniques for complex systems, application to structural codes. Prerequisite: 203 or equivalent.

4 units, Spr (Kiremidjian)

214. Symbolic Modeling in Engineering—Issues concerning symbolic model-based reasoning systems in engineering. Lab course to study and create symbolic models using Artificial Intelligence representation and reasoning techniques, and engineering principles and heuristics. Prerequisite: Computer Science 106A or equivalent.

4 units, Aut (Kunz)

222A. Computer Integrated Architecture/Engineering/Construction (A/E/C)—Multi-disciplinary, collaborative, multi-site teamwork in a project-centered environment. Student teams (architect, structural engineer, construction manager, and undergraduate apprentice) are exposed to computer-
based discipline tools and exercise these tools and acquired theoretical knowledge in a multi-disciplinary, collaborative context. Short design exercises sharpen awareness of multi-disciplinary perspectives and cross-disciplinary impacts, and develop teamwork skills for a comprehensive building project. Enrollment limited and based on interviews.

3 units, Win (Fruchter)

222B. Computer Integrated Architecture/Engineering/Construction (A/E/C)—Continuation of 222A. Multidisciplinary student teams work on complex building projects based on client specifications. Design and construction alternatives are subjected to rigorous examination by rapid computational prototyping, concurrent multi-disciplinary evaluation, and trade-off analysis. Alternative solutions are subjected to iterative critiques performed by faculty and industry mentors. Incremental propose-critique-explain-refine development cycles are supported by the Project-Based Learning Lab’s CAD, simulation, communication, modeling and Internet service facilities. Enrollment limited and based on interviews.

2 units, Spr (Fruchter)

237. Introduction to Biotechnology—(Same as Biochemistry 237, Biological Sciences 237, Biophysics 237, Chemical Engineering 237, Developmental Biology 237, Structural Biology 237.) Faculty from the Departments of Biochemistry, Biological Sciences, Chemical Engineering, Civil and Environmental Engineering, Developmental Biology, Genetics, Molecular Pharmacology, Structural Biology, and invited industrial speakers review the interrelated elements of modern biotechnology. Topics: protein structure and dynamics, protein engineering, biocatalysis, gene expression, cellular metabolism and metabolic engineering, fermentation technology, and purification of biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences or engineering.

3 units (Robertson) given 1998-99

240. Analysis and Design of Construction Operations—Planning and management of construction work at the field operations level. Data collection, analysis, simulation, modeling, and design. Emphasis on work methods development, productivity, safety, and total quality management. Students prepare studies of and reports about local construction projects.

2 units Aut (Staff)

240L. Applications of Operations Analysis and Design—Hands-on experience as construction volunteer at a Bay Area low-cost housing project. Opportunities to apply planning and analysis skills learned in 240, while working with groups of volunteers performing specific field tasks. Corequisite: 240.

1 unit (Paulson) given 1998-99

241. Techniques of Project Planning and Control—Fundamental concepts of project planning and control; current and future project information technologies; project planning and control systems at the firm and project level. Topics: cost estimating at conceptual, schematic, detailed, and bid stages, measurement and pricing of work; work breakdown structures; planning and scheduling techniques, including CPM, PERT, LOB; resource allocation; project control; supply chain models; treatment of uncertainty; integration of time and cost planning and control, and 4D modeling. Group term project including technical report and presentation.

3-4 units, Win (Fischer)

242. Project and Company Organizations—Builds on crew-level work process design concepts from 240, providing an introduction to organizational behavior, and in-depth contingency theory of organizational design for construction projects and firms, using computer-based organizational analysis tools. Case studies on facility design and construction organizations; concepts are applicable to project-focused teams in other industries. Groups of 12 students practice running problem-focused meetings, one case study per week outside class. Prerequisite: 240 or equivalent.

3 units, Win (Levitt)

243. Computer Applications in Construction—Analysis, design, development, and implementation of computer-based systems for construction engineering and management. Supporting topics cover computer hardware and software technology. Required individual projects build on construction knowledge and experience. Field trips. Prerequisite: Computer Science 106A or equivalent.

3 units (Paulson) given 1998-99


2 units, Aut (Tucker, Meyer)

244B. Advanced Construction Accounting, Financial Issues, and Claims—Continuation of 244A. Emphasis on advanced construction accounting and economic issues, the recovery of project overruns, and the understanding of construction industry financial disclosures. Construction claims and project cost overrun analysis and cost recovery methods related to labor, equipment, indirect, overhead, cost of capital, and profit claims. Schedule delay analysis in the context of claims.

2 units, Win (Tucker, Meyer)
246. Managing Engineering and Construction Companies—Administration and management of design and construction companies in the architecture-engineering-construction industry. Focus is on management of risks inherent in the A-E-C industry: developing strategies to cope with cyclical demand, alternative contracting approaches, managing receivables and cash flow, administration of human resources, safety, quality, insurance and bonding. Students can develop a business plan for a new or existing company or market opportunity for a fourth unit.

3-4 units, Spr (Levitt)


3 units, Win (Clough)

248. Real Estate Development—Overview of the real estate development process, emphasizing critical activities and key participants. Topics: conceptual and feasibility studies, market perspectives, the public roles, steps for project approval, project finance, contracting and construction, property management and sales. Group term projects focus on actual developments now in the planning stage. Prerequisites: 244A or equivalent, Engineering 60.

3 units, Spr (Staff)

249. Labor and Industrial Relations in Construction—The history, laws, institutions, and social and economic forces affecting labor and industrial relations in construction; covers union and open-shop sectors. Comparative labor relations (other nations), simulated collective bargaining and arbitration exercises; field trip.

3 units, Spr (Clark, Walton)

250. International Construction—Prepares construction professionals for international projects; differences in construction systems, technology, management, and culture between advanced industrial countries (AIC), newly industrialized countries (NIC), and less developed countries (LDC); privatization of infrastructure, economic drivers of construction projects, risks, and risk management. Material from a construction market viewpoint and the viewpoint of a single project and firm. Individuals research paper, case studies, and class presentation.

3 units, Spr (Fischer)


4 units, Aut (Tatum)


1 unit, Aut (Tatum)

253. Construction Equipment and Methods—Undergraduates register for 153; see 153. Term project required. Prerequisite: 252.

3 units, Win (Staff)


3 units, Spr (Clough)

256. Building Systems Analysis—See 156.

4 units, Win (Tatum)

257. High-Tech and Industrial Construction—Basic production processes, special process systems, and special installation operations for semiconductor fabrication, biotechnology, power, and other high-tech and industrial plants. Class sessions discuss production processes, critical systems, and special installation operations; field trips to plants under construction and operating facilities. Students electing third unit prepare summaries of plants and special systems; student groups present analysis of additional plants and process systems.

2-3 units, Spr (Tatum)

258A.B.C. Donald R. Watson Seminar in Construction Engineering and Management—Weekly discussions of special topics with speakers from industry and government. Normally taken by construction graduate students each quarter for three quarters. Lecture builds on construction graduate courses. (AU)

258A. 1 unit, Aut (Clough)

258B. 1 unit, Win (Tatum)

258C. 1 unit, Spr (Levitt)

259A.B.C. Construction Problems—Analysis of group-selected problems in construction techniques, equipment, or management, followed by preparation of oral and/or written reports. Students consult specialists from the construction industry and make use of University facilities. See 299 for alternative individual studies. Prerequisites: graduate standing in construction and consent of instructor.

259A. 1-3 units, Aut (Staff)

259B. 1-3 units, Win (Staff)

259C. 1-3 units, Spr (Staff)

260A. Physical Hydrogeology—Same as Geological and Environmental Sciences 230. Theory of underground water, analysis of field data and pumping tests, geologic groundwater environments, solution of field problems, groundwater modeling. Introduction to groundwater contaminant transport and unsaturated flow. Lab. Prerequisite: elementary calculus. (WIM)

5-6 units, Aut (Konikow)

260B. Surface and Near-Surface Hydrologic Response—Same as Geological and Environmental Sciences 237. Quantitative review of process-
based hydrology and geomorphology. Introduction to finite-difference and finite-element methods of numerical analysis. Topics: biometeorology, unsaturated and saturated subsurface fluid flow, overland and open channel flow, erosion and mass wasting, and physically-based simulation of coupled surface and near-surface hydrologic response and landscape evolution. Links hydrogeology, soil physics, and surface water hydrology.

4 units, Aut (Loague)
alternate years, not given 1998-99

260C. Contaminant Hydrogeology—(Same as Geological and Environmental Sciences 231.) For earth scientists and engineers interested in environmental and water resource problems involving contaminated groundwater. Processes affecting contaminant migration through porous media including interactions between dissolved substances and solid media. Conceptual and quantitative treatment of advective-dispersive transport with reacting solutes. Predictive models of contaminant behavior controlled by local equilibrium and kinetics. Modern methods of contaminant transport simulation and optimal aquifer remediation. Recommended: 260A.

4 units, Spr (Gorelick)

262A. Hydrodynamics—The flow of incompressible viscous fluid; emphasis on developing an understanding of fluid dynamics that can be applied to environmental flows. Topics: kinematics of fluid flow; equations of mass and momentum conservation (including density variations); some exact solutions to the Navier-Stokes equations; appropriate analysis of fluid flows including Stokes flows, potential flows, and laminar boundary layers; and an introduction to the effects of rotation and stratification through scaling analysis of fluid flows. Prerequisites: 101B or equivalent, and some knowledge of vector calculus.

3-4 units, Aut (Monismith)

262B. Transport and Mixing in Surface Water Flows—Application of fluid mechanics to problems of pollutant transport and mixing in the water environment. Mathematical and numerical models of advection, diffusion, and dispersion. Application of theory to problems of transport and mixing in rivers, estuaries, and lakes and reservoirs. Prerequisite: 262A. Recommended: Mechanical Engineering 100 or equivalent.

3-4 units, Win (Koseff)

262C. Modeling Environmental Flows—Introduction to turbulence concepts and models, and to basic concepts of numerical simulation and computer modeling of turbulence. Application of models to open channel, estuary, lake, and reservoir simulations. Use of computer models for estuarine hydrodynamics, reservoir dynamics, and stream water quality. Prerequisite: 262A. Recommended; 262B.

3-4 units, Spr (Monismith)


3-4 units, Win (Jacobson)


3-4 units, Spr (Jacobson)

263S. Climate Theory, Modeling, Applications, and Implications—(Same as Biological Sciences 217.) History of the coevolution of climate and life. Theories of climate, external and internal climatic forcings, definitions of climate and the climate system, and rationale for climatic modeling. Hierarchy of climatic models; interactions among atmosphere, biosphere, oceans, hydrosphere, and cryosphere. Climatic predictability; implications of predictions and relevance to current controversies. Prerequisites: 163 and math through differential equations, or biology core, or consent of instructor.

3 units, Win (Schneider)
alternate years, not given 1998-99

265. Sustainable Water Resources Development—Alternative criteria for judging sustainability of projects. Application of criteria to evaluate sustainability of water resources projects in several countries. Cases illustrate the role of political, social, economic, and environmental factors in decision making. Evaluation of benefit-cost analysis and environmental impact assessment as techniques for enhancing sustainability of future projects. Limited enrollment. Prerequisite: graduate standing in Environmental and Water Studies Program, or consent of instructor.

3 units, Win (Ortolano)

266. Environmental Policy Design and Implementation—Regulation, market incentives, the courts, and negotiation as bases for environmental
management programs. Case studies involve implementation of air and water pollution control laws, hazardous waste management programs, and environment impact assessment. Limited enrollment. Prerequisite: 171 or graduate standing in the Environmental and Water Studies program.

4 units, Spr (Orotolano)


3-4 units, Spr (Kitanidis)


3-4 units, Win (Kitanidis)

269. Water Resources Seminar—Problems in all branches of water resources, with talks by visitors, faculty, and students.

1 unit, Spr (Monismith)

270. Movement, Fate, and Effects of Contaminants in Surface Waters and Groundwater—Transport of chemical constituents in surface and groundwater, including advection, dispersion, sorption, interphase mass transfer, and transformation; water quality requirements for various beneficial uses. Emphasis on the behavior of hazardous waste contaminants. Prerequisites: undergraduate chemistry and calculus. Recommended: 101B.

3 units, Aut (Roberts)


3 units, Win (Roberts)

271B. Biological Processes—Biological processes for transformation of environmental contaminants. Unit processes for biological treatment including dispersed growth and fixed-film systems. Aerobic and anaerobic process, microbial ecology, and kinetics, with applications to the treatment of municipal and industrial wastewaters, hazardous chemicals, and groundwater. Prerequisites: 270, 274A.

3 units, Win (McCarty)

271C. Treatment Process Design—Analysis of specialized water pollution control processes such as adsorption, oxidation, and air stripping. Emphasis on physical and chemical processes in the treatment of hazardous wastes, especially contaminated groundwater. Definitions of problems and objectives, evaluation of alternatives for example cases, preliminary process design, and cost evaluations. Design-oriented class project and field trips. Prerequisites: 270, 271A.

3 units (Roberts) alternate years, given 1998-99

272. Hazardous Waste Management and Remediation Design—Management of hazardous waste and remediation of contaminated sites. Definition of hazardous waste, characterization of contaminated sites, risk-based decision analysis, and engineering analysis of chemical, thermal, and biological technologies for treatment of hazardous waste, contaminated soil, and groundwater. Application of computer software packages for selected treatment technologies. Preliminary process design for treatment technologies such as air stripping, activated carbon adsorption, and chemical oxidation. Prerequisites: 271A, 271B.

3-5 units (Kavanaugh, Roberts) alternate years, not given 1998-99

273. Aquatic Chemistry—(Same as Geological and Environmental Sciences 264.) Chemical principles and application of those principles to the analysis and solution of problems in aqueous geochemistry (temperatures near 25°C and atmospheric pressure). Emphasis is on the analysis of natural water systems and the understanding and solution of specific chemical problems in water purification technology and water pollution control. Prerequisites: Chemistry 31 and 33, or equivalent.

3 units, Aut (Redden)

273A. Water Chemistry Laboratory—Laboratory application of techniques for the analysis of natural waters and wastewaters, emphasizing instrumental techniques.

2 units, Win (Redden)

bacterial adhesion and biofilm formation. Microbes in the degradation of pollutants. Prerequisites: Chemistry 33, 35, or equivalents.

3 units, Aut (Spormann)


3 units, Win (Spormann)

274C. Environmental Microbiology Laboratory—Microbiological, biochemical, and molecular techniques for characterizing microbes: enrichment and isolation of microorganisms, metabolic and phylogenetic characterization of isolates, determination of growth parameters (growth rate, growth yield, fermentation balance), enrichment and isolation of microorganisms degrading pollutants, detection of microorganisms in the environment, water quality parameters. Horizontal gene transfer. Prerequisites: 274A, 274B.

3 units, Spr (Spormann)

275A. Water Quality Control Processes I—Lab and pilot plant studies of physical and chemical processes for the treatment of water and wastewaters. Prerequisites: 271A, 273, 273A.

3 units, Redden

alternate years, not given 1998-99


3 units, McCarty

alternate years, given 1998-99


3 units, Aut (Hildemann)


3 units (Hildemann) given 1998-99

279. Environmental Engineering Seminar—Exposure to current research, practice, and thinking in environmental engineering and science. Attendance at seminars is self-directed, and may be accrued throughout the school year. See instructor for further information.

1 unit, Spr (Spormann)

281A. Finite Element Structural Analysis I—Introduction to the finite element method for solids and structures. Model problems in one dimension including axial, flexural, torsional, and shear deformations; strong and weak forms; variational equation and relation to a principle of virtual work; finite element approximation based on local interpolation; element stiffness matrices and load vectors; direct assembly procedure. Analysis of complex two- and three-dimensional truss and frame structures, thermal loads, and substructure techniques for large systems. Analysis of two-dimensional problems including the quasi-harmonic equation (deflection of a membrane, heat conduction, etc.) and two-dimensional elasticity. Element families, isoparametric mapping, numerical integration. Practical modeling techniques. Computer lab. Prerequisites: elementary structural analysis and matrix algebra.

4 units, Aut (Kollar)


4 units, Win (Kollar)

282A. Earthquake Engineering I—Earthquake phenomena, faulting, ground motion, study of past major earthquakes, effects of earthquakes on man-made structures, response spectra, Fourier spectra, power spectra, random vibration analysis of single
and multi-degree of freedom systems, soil effects on ground motion and structural damage, methods for structural damage evaluation, current research in earthquake engineering. Prerequisites: 203, 296A.

3 units, Win (Kiremidjian)

282B. Earthquake Engineering II—Earthquake motions and their engineering interpretations, strong ground motion studies, design spectrum and design earthquake, importance of dynamic analysis of structures, geologic and soil engineering problems, design of structures to minimize earthquake damage, risk analysis, earthquake codes. Prerequisite: 282A or consent of instructor.

3 units, Spr (Zsutty)


3 units, Win (Law)


4 units, Aut (Krawinkler)

286. Design of Structures II—General aspects of design, serviceability and failure criteria, types of loading, methods of design, structural systems for buildings, analysis and design of buildings for gravity and lateral loads, earthquake resistant design, effects of dynamic loading on strength and ductility of structural elements. Prerequisites: basic courses in design of steel and reinforced concrete structures.

4 units, Win (Krawinkler)

287. Structural Performance and Failures—Basic concepts in the definition of satisfactory structural performance; key elements in structural performance; types of failures, ranging from reduced serviceability to total collapse; failure sources and their root cause allocation, emphasizing design/construction process failures; failure prevention mechanisms; illustration with real life examples.

2 units, Spr (Moncarz)

288. Computer Methods in Structural Engineering—Introduction to basic techniques for the development of structural engineering analysis and design software. Topics: basic data structure; computer representation of engineering systems; implementation of advanced numerical methods and engineering software; automated conformance checking of design codes and standards. Prerequisites: 281A, 285 or equivalent, and Computer Science 106A or equivalent.

3 units (Law) given 1998-99


3 units, Spr (Borja) alternate years, not given 1998-99

290. Advanced Soil Mechanics—Theory of particulate media; micromechanics of granular materials; constitutive laws in geomechanics; plasticity; return-mapping algorithms; classical yield models: Mises, Mohr-Coulomb, Drucker-Prager; critical state theory and Cam-clay type models; multi-surface and bounding surface type models; drained and undrained conditions; numerical simulations. Prerequisites: 101C, Mechanical Engineering 238A, or equivalents.

3 units (Borja) alternate years, given 1998-99

291. Foundation Engineering—Types, characteristics, analysis, and design of shallow and deep foundations; rigid and flexible retaining walls; braced excavations; settlement of footings in sands and clays; slope stability analysis by method of slices including search algorithms for the critical slip surface. Special seminars by guest speakers; computing assignment. Prerequisite: 101C or equivalent.

3 units, Win (Borja)

293. Experimental Soil Mechanics—Lab determination of stress-strain-strength parameters for soils under drained and undrained loading conditions. Six lab experiments. Prerequisite: 101C or equivalent.

2 units, Win (Borja)

294. Issues in Geotechnical and Environmental Failures—Causes and consequences of the failure of buildings, earth structures, waste storage, and high hazard facilities in contact with the environment; technical, ethical, economic, legal, and business aspects; failure analysis and forensic problems; prevention, liability, and dispute management. Case history approach based on the instructor's files including earthquake, flood, and hazardous waste facilities. Student observation, participation in active lawsuits where possible.

3 units, Spr (Meehan)

296A. Structural Dynamics I—Vibrations and dynamic response of simple structures under time dependent loads, dynamic analysis of single and
multiple degrees of freedom systems, support motion, response spectra.

4 units, Aut (Law)

296B. Structural Dynamics II—Methods of structural dynamics for discretized and continuous systems in free and forced vibration, formulation and solution of partial differential equations of motion, potential and kinetic energy methods, mode-superposition, Rayleigh quotient, numerical solution to the eigenvalue problem, direct integration methods; frequency domain analysis introduction to nonlinear dynamics. Prerequisite: 296A.

4 units, Spr (Winterstein)

298. Structural Engineering and Geomechanics Seminar—Recommended for all graduate students. Lectures on topics of current interest in professional practice and research. (AU)

1 unit, Win (Staff)

299. Independent Study in Civil Engineering—Directed study for graduate students on subjects of mutual interest to students and faculty. Student must obtain faculty sponsor.

1-3 units, any quarter

300. Thesis—Investigation of an engineering problem; required of candidates for degree of Engineer. Aut, Win, Spr (Staff)

310. Post-Master’s Seminar—For post-master’s students to serve as orientation to the selection of a research topic.

1 unit, Aut, Win, Spr (Staff)

316. Using Models to Guide Facility Engineering Research—How different kinds of models in the social and physical sciences can guide a variety of engineering and research efforts. Not a traditional research methodology class. Focuses on the “art” and “science” of developing models to advance high quality research projects. Students iterate through several cycles of preparing and critiquing a research proposal to enhance modeling skills. Grades based on answers to queries, and on written and oral presentations of proposals.

2 units, alternate years, given 1998-99

320A,B,C. Integrated Facility Engineering—Individual and group presentations on goals and state-of-practice of integrated facility engineering, including objectives for integrated computer systems. (AU)

1 unit, Aut, Win, Spr (Fischer, Kunz)

342. Computational Modeling of Organizations—For post-M.S. students interested in formal techniques for organization design. Computer simulation of organizations are used to conduct “virtual experiments” for developing organization theory or to analyze the performance of “virtual organizations” with different structures and decision support/communication technologies. Goals: introduce research on computational modeling and design of real-world organizations. Paper as research proposal. Prerequisite: 242 or equivalent introductory organization design class.

4-5 units (Staff) given 1998-99


1 unit, Aut (Hampson)

362. Advanced Topics in Subsurface Transport—Mathematical analysis of flow and transport in porous and fractured media. Topics vary each year, including: solution of flow and transport equations, stochastic analysis, homogenization, and estimation methods. Prerequisite: consent of instructor.

3 units, Aut (Kitanidis)


3 units, Win (Monismith)

367. Seminar: Advanced Topics in Environmental Fluid Mechanics and Hydrology—Open to Ph.D. students in the program. Focuses on selected research; 1997-98 topic is sediment transport. Presentation of work in progress and reviews of work in field.

2 units, Aut (Street)


2-3 units (Reinhard)

alternate years, given 1998-99

372. Mass Transfer Seminar—Student-led discussion of readings. Basic concepts of diffusion and interphase mass transfer, and the role of mass transfer limitations in the fundamental processes that affect water quality. Applications to water treatment and contaminant transport in surface and groundwater, and to hazardous chemical behavior. Prerequisites: 270, 271A, and post-M.S. status.

2 units (Roberts)

alternate years, not given 1998-99

379. Environmental Management and Policy Analysis—(Same as Business 312E.) Priority given to Environmental and Water Studies graduate students. Environmental considerations are increasingly central to business activity and present business opportunities. Managers need to effectively incorporate these considerations into their decision-making processes. Speakers from industry and nonprofits cover the basics of environmental sci-
ence and economics, and show how companies are addressing environmental management. Selected public policy issues identify effective policy and show how managers can affect or anticipate policy changes. Group project (research paper or working with a company or environmental organization). Enrollment limited.

4 units, Spr (Bulow)

397. Random Vibrations—Concept of random vibrations; description of the vibratory motion of probabilistic summary; concept of stationarity, ergodicity; correlation and autocorrelation; Fourier analysis; spectral density function; input/output relationship for linear systems; transmission of random vibrations. Prerequisite: post-M.S. standing.

2 units (Staff) alternate years, given 1998-99

398. Report on Civil Engineering Training—On-the-job training under the guidance of experienced, on-site supervisors; meets the requirements for Curricular Practical Training for students on F-1 visas. Students submit a concise report detailing work activities, problems worked on, and key results. Prerequisite: written consent of adviser.

1 unit, any quarter (Staff)

399. Advanced Engineering Problems—Individual projects on selected topics. Independent graduate work under the direction of a faculty member on a subject of mutual interest. Student must obtain faculty sponsor. Written report usually required.

1-5 units, any quarter (Staff)


Aut, Win, Spr (Staff)

COMPUTER SCIENCE


Chair: Jean-Claude Latombe

Associate Chair for Education: Eric S. Roberts


Associate Professors: David Dill, Michael Gene-sereth, Anoop Gupta, Oussama Khatib, Monica Lam, Marc Levoy, Rajeev Motwani, Serge A. Plotkin, Yoav Shoham, Andrew M. Stuart, Jennifer Widom

Assistant Professors: Mary G. Baker, Dan Boneh, Daphne Koller, Nick McKeown, Mendel Rosenblum, Carlo Tomasi

Professors (Research): Thomas Binford, Richard Fikes, Gio Wiederhold

Professor (Teaching): Eric S. Roberts

Courtesay Professors: Giovanni DeMicheli (Electrical Engineering), Michael J. Flynn (Electrical Engineering), Mark A. Horowitz (Electrical Engineering), Martin Kay (Linguistics), Grigorori Mints (Philosophy), David E. Rumelhart (Psychology), Edward A. Shortliffe (Medicine), Fouad A. Tobagi (Electrical Engineering)

Courtesay Associate Professors: John T. Gill, III (Electrical Engineering), Teresa Meng (Electrical Engineering), Mark A. Musen (Medicine)

Courtesay Assistant Professors: Russ B. Altman (Medicine), David Heeger (Psychology), Oye-kunle Olukotun (Electrical Engineering)

Affiliated Professor (Research): David Luckham (Electrical Engineering)

Lecturers: Margaret Johnson, Nicholas J. Parlante, Robert Plummer, Patrick Young, Julie Zelenksi, Song Chun Zhu

Acting Assistant Professor: Harbir Lamba


Consulting Associate Professor: Ted Selker

Consulting Assistant Professor: Craig Partridge

The Department of Computer Science (CS) operates and supports computing facilities for departmental education, research, and administration needs. These CS systems are connected to SUNet, the campus-wide Ethernet/FDDI backbone network, and SUNet is connected to the Internet through BARNet.

All CS students have access to two departmental student machines, an HP9000-755 and a MultiCPU SUN 4/760, as well as a cluster of public workstations in the Gates Building. In addition, most students have access to systems associated with their research areas.

Each research group in CS has systems specific to its research needs. These systems range from PC clones/Macs to high-end Multi-CPU SGIs and SUNs. Servers and workstations manufactured by DEC, SUN, HP, SGI, Intel, Apple, and IBM are also in place.

Support for course work and instruction is provided on systems available through Information Technology Systems and Services (ITSS).

UNDERGRADUATE PROGRAMS

The department offers a degree in Computer Science, as outlined in the “School of Engineering” section of this bulletin. In addition, there are several interdisciplinary degrees with a substantial computer science component. The Computer
Systems Engineering major (also in Engineering) allows the study of issues of both computer hardware and software, bridging the gap between traditional CS and Electrical Engineering majors. The Symbolic Systems major (in the School of Humanities and Sciences) offers a chance to explore computer science and its relation to linguistics, philosophy, and psychology. Finally, the Mathematical and Computational Sciences major (also Humanities and Sciences) allows students to explore computer science along with more mathematics, statistics, and operations research.

For information about a CS minor, see the “School of Engineering” section of this bulletin.

GRADUATE PROGRAMS
MASTER OF SCIENCE

The University’s basic requirements for the M.S. degree are discussed in the “Graduate Degrees” section of this bulletin.

The M.S. degree in Computer Science is intended as a terminal professional degree and does not lead to the Ph.D. degree. Students planning to obtain the Ph.D. degree should apply directly for admission to the Ph.D. program.

Applications for admission to the M.S. program, and all of the required supporting documents, must be received before December 1, 1997. Exceptions are made for applicants who are either Honors Co-op applicants or who are already students at Stanford (including coterminal applicants). Information on these deadlines is available from the department.

REQUIREMENTS

A candidate is required to complete a program of 45 units. At least 36 of these must be graded units, passed with an average 3.0 (B) grade point average (GPA) or better. The 45 units may include no more than 21 units of courses from those listed below in Requirements 1 and 2. Thus, students needing to take more than seven of the courses listed in Requirements 1 and 2 actually complete more than 45 units of course work in this program.

Only extremely well-prepared students may expect to finish the program in one year; most complete the program in six quarters. It is expected that an adequately prepared student admitted to the M.S. program will have taken a number of the core courses as an undergraduate. Students hoping to complete the program with 45 units should already have a substantial background in computer science, including course work or experience equivalent to all of Requirement 1 and some of the courses in Requirement 2.

Requirement 1—The following courses may be needed as prerequisites for other courses in the program: CS 107, 108, 109, 193L (for specialization 5 only); Electrical Engineering 182; Math. 109 or 120.

Requirement 2—The following core courses or their equivalent must be completed: CS 137 or 237A, 143, 221 (required for specialization 5) or 121 or 145 or 245A, 154, 157, 161, 240A; Electrical Engineering 282 or 282H; Statistics 116. Courses are waived only if evidence is provided that a similar course has been taken elsewhere.

Courses that are waived rather than taken may not be counted toward the M.S. degree. Core courses may be taken on a Satisfactory/No Credit basis provided that a minimum of 36 graded units is presented within the 45-unit program.

Requirement 3—At least 1 but no more than 3 units of 500-level seminars must be taken.

Requirement 4—A program of 21 units in an area of specialization must be completed. All courses in this area must be taken for letter grades. Eight approved programs are listed below. Students may propose to the M.S. program committee other coherent programs that meet their goals and satisfy the basic requirements. Students who want to include a substantial research project as part of their degree program can arrange with their adviser to replace units in their specialization with a CS 393 (Computer Laboratory) project.

1. Numerical Analysis/Scientific Computation
   a) CS 237A, 237B, 237C

2. Systems
   a) CS 240B, 242
   b) At least three of: CS 243, 244A, 245A, 248, 348B; Elect. Engr. 271, 275, 382
   c) At least 6 more units selected from ‘2b’ and from the following: CS 194, 244B, 244C, 245B, 249, 315A, 315B, 341, 342, 343, 344, 345, 347, 348A, 349, 448; Elect. Engr. 183, 272A, 272B, 281, 374, 392X, 392Y, 482, 487, 488, 489; Psych. 267

3. Software Theory
   a) CS 242, 243, 256, 258
   b) At least one of: CS 244A, 245A, 342, 343, 345
   c) At least one course from the following: 261, 361A, 361B, 365
   d) At least one additional course selected from ‘3b,’ ‘3c,’ CS 245B

4. Theoretical Computer Science
   a) CS 256, 258, 261
   b) At least 12 more units from CS 228, 345, 351, 353, 355, 357, 358, 361A, 361B, 365, 367A, 367B, 368; Engr.-Econ. Syst. & Op. Res. 318

5. Artificial Intelligence
a) At least four of: CS 222, 223A, 223B, 227, 228, 229
b) A total of 21 units from the above and from the following: CS 205, 224, 225, 226, 256, 257, 271, 274, 323, 325, 326A, 326B, 327A, 327B, 328, 329, 354, 377, 379, 425, 426

6. Database
a) CS 245A
b) Two of: CS 245B, 345, 347
c) Four additional courses selected from ‘6b’ and from the following: CS 222, 240B, 242, 243, 244A, 244B, 244C, 246, 249, 270, 271, 272, 315A, 315B, 341, 344, 395; Elect. Engr. 489

7. Human-Computer Interaction
a) CS 147, 247A, 247B
b) At least 6 units from: CS 246, 248, 377 (may be taken repeatedly), 378
c) A total of 21 units from the above and from the following: CS 249, 270, 272, 348A, 348B, 448; Mech. Engr. 101, 215; Psych. 203, 221, 266; Communication 269, 270, 272, 272

8. Real-World Computing
a) At least two of: CS 223A, 223B, 248
c) A total of 21 units from the above and from the following: CS 224, 225, 247A, 274, 326B, 327A, 328, 336, 399, 448; Psych. 267

Requirement 5—Additional elective units must be technical courses (numbered 100 or above) related to the degree program and approved by the adviser. Elective courses may be taken on a Satisfactory/No Credit basis provided that a minimum of 36 graded units is presented within the 45-unit program.

DOCTOR OF PHILOSOPHY

The University's basic requirements for the Ph.D. are discussed in the “Graduate Degrees” section of this bulletin. Applications to the Ph.D. program and all supporting documents must be received before December 1, 1997. The following are department requirements (see the Computer Science graduate programs administrator for further details):

1. A student should plan and successfully complete a coherent program of study covering the basic areas of computer science and related disciplines. The student’s adviser has primary responsibility for the adequacy of the program, which is subject to review by the Ph.D. program committee.

2. Each student, to remain in the Ph.D. program, must satisfy the breadth requirement covering introductory level graduate material in major areas of computer science. Once a student fulfills five of the seven whole areas of the breadth requirement, he or she may apply for admission to candidacy for the Ph.D. This must be done by the end of the second year in the program. The student must completely satisfy the breadth requirement by the end of nine quarters (excluding summers), and must pass a qualifying exam in the general area of the expected dissertation.

3. As part of the training for the Ph.D., the student is required to complete at least 4 units (a unit is 10 hours per week for one quarter) as a teaching assistant or instructor for courses in Computer Science numbered 100 or above.

4. The most important requirement is the dissertation. After passing the qualifying examination, each student must secure the agreement of a member of the department faculty to act as the dissertation adviser. (In some cases, the dissertation adviser may be in another department.)

5. The student must pass a University oral examination in the form of a defense of the dissertation. It is usually held after all or a substantial portion of the dissertation research has been completed.

6. The student is expected to demonstrate the ability to present scholarly material orally, both in the dissertation defense and by a lecture in a department seminar.

7. The dissertation must be accepted by a reading committee composed of the principal dissertation adviser, a second member from within the department, and a third member chosen from within the University. The principal adviser and at least one of the other committee members must be Academic Council members.

Ph.D. MINOR

For a minor in Computer Science, a candidate must complete 20 units of computer science course work, including at least three of the master's core courses to provide breadth, and one course numbered 300 to provide depth. The remaining courses must be numbered 200 or above. One of the courses taken must include a significant programming project to demonstrate programming proficiency. A grade point average (GPA) of 3.0 or better must be maintained.

TEACHING AND RESEARCH ASSISTANTSHIPS

Graduate student assistantships are available. Half-time assistantships receive a tuition scholarship for 9 units per quarter during the academic year, and in addition receive a monthly stipend. Duties for half-time assistants during the academic year involve approximately 20 hours of work per week. Teaching assistants (TAs) help an instructor teach a course by conducting discussion sections, consulting with students, grading examinations, and so on. Research assistants (RAs) help faculty and senior staff members with
research in computer science. Most teaching and research assistantships are held by Ph.D. students in the Department of Computer Science. If there is an insufficient number of Ph.D. students to staff teaching and research assistantships, then these positions are open to a limited number of master's students in the department. However, master's students should not plan on being appointed to an assistantship.

Students with fellowships may have the opportunity to supplement their stipends by serving as graduate student assistants.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirement.

(AU) indicates that the course is subject to the University Activity Unit limitations (8 units maximum).

GUIDE TO SELECTING INTRODUCTORY COURSES

Students arriving at Stanford have widely differing backgrounds and goals, but most find that the ability to use computers effectively is beneficial to their education. The department offers many introductory courses to meet the needs of these students.

For students whose principal interest is an exposure to the fundamental ideas behind computer science and programming, 105 is the most appropriate course. It is intended for students in nontechnical disciplines who expect to make some use of computers, but who do not expect to go on to more advanced courses. CS 105 meets the Area 2b General Education Requirement and includes an introduction to programming, the discipline of computer science, and the social implications of computing. Students interested in learning to use the computer as a tool should consider 1C (Using the Macintosh) or 1U (Introduction to Unix).

Students who intend to pursue a serious course of study in computer science may enter the program at a variety of levels, depending on their background. Students with little prior experience or who wish to take more time to study the fundamentals of programming should take 106A followed by 106B. Students in 106A need not have prior programming experience. Students with significant prior exposure to programming or who want an intensive introduction to the field should take 106X, which covers most of the material in 106A, B in a single quarter. All instruction in CS 106 uses ANSI C, although the prior programming experience required for 106X may be in any language. In all cases, students are encouraged to discuss their background with the instructors responsible for these courses.

After the introductory sequence, Computer Science majors and those who need a significant background in computer science for related majors in engineering should take 107, 108, and 109 (or 109A and B). CS 107 exposes students to a variety of programming paradigms that illustrate critical strategies used in systems development; 108 builds on this material, focusing on the development of large interactive programs based on the object-oriented programming paradigm. The 109 (or 109A and B) course constitutes a broad introduction to the underlying theory and conceptual structures used in computer science.

In summary:

For exposure—1C or 1U
For nontechnical use—105. For scientific use—106A
For a technical introduction—106A
For significant use—106A, B or 106X, followed by 107, 108, and 109 (or 109A and B)

NUMBERING SYSTEM

The first digit of a CS course number indicates its general level of difficulty:

0-99 service courses for nontechnical majors
100-199 other service courses, basic undergraduate
200-299 advanced undergraduate/beginning graduate
300-399 advanced graduate
400-499 experimental
500-599 graduate seminars

The tens digit indicates the area of Computer Science it addresses:

00-09 Introductory, miscellaneous
10-19 Hardware Systems
20-29 Artificial Language
30-39 Numerical Analysis
40-49 Software Systems
50-59 Mathematical Foundations of Computing
60-69 Analysis of Algorithms
70-79 Typography and Computational Models of Language
90-99 Independent Study and Practicum

NONMAJOR

1C. Using the Macintosh—Introduction to using the Apple Macintosh, including exposure to a word processor, communications facilities, spreadsheets, and other software packages. Weekly one hour lecture/demonstration with demonstrated software package. No exams or problem sets. Not a programming course.
1 unit, Aut (Staff)

II. The Internet—For a computer-literate but not technical audience. What is the Internet and what is it good for? The foundations, resources, and uses of the Internet, emphasizing practical skills for finding, reading and authorizing materials. Topics: nontechnical introduction to FTP, Gopher, HTTP, the
World Wide Web, and Java; HTML and basic Internet publishing; evolution and future directions; security and privacy issues. Programming-oriented course is 131. Prerequisites: basic computer skills at level of 1C, e.g., file editing, and access to a computer on the Internet.

1U. Introduction to Unix—Tutorial on using the Unix operating system. Topics: text editors, the file system, the C shell, standard Unix utilities, PERL. Includes simple shell programming, but is not a programming course and assumes no prior exposure to programming.

1 unit, Spr (Zelenski)

50. Problem Solving with Mathematica—For engineers, physicists, mathematicians, and others who need to solve mathematical or quantitative problems. Comprehensive introduction to Mathematica, an interactive mathematical software package that includes a high-level programming language. Symbolic, numerical, graphical, animation, and programming capabilities, including use of Mathematica to manipulate expressions, find roots, solve differential equations, visualize functions and data, import and export data in arbitrary formats.

2 units (Blachman) alternate years, given 1998-99

99A. Stanford Introductory Seminar: The Downside of Computing Systems—Preference to freshmen. Computers are critical components of our world in such tasks as surgery, air traffic control, and international banking. How computing systems fail, how such failures may affect our society in the future, and how to build and maintain systems to avoid failures. Case studies of computer-related disasters, including the Therac-25 accidents, the Internet worm, and the Ariane 5 crash. Topics: computer security, robust distributed systems, fault-tolerant architectures, organizational behavior.

3 units, Aut (Baker)

99B. Stanford Introductory Seminar: Getting the Physical World into the Computer—Preference to freshmen. Representing the physical world in the computer has become a critical need for many industries. In design and manufacturing, computers build virtual mockups of new products and check their manufacturability. In biology, molecules are simulated to understand folding and binding processes. In video games, computers create and animate digital actors that can "sense" their virtual environments. The concepts and techniques for acquiring data, developing models, and reasoning about the physical world: computational geometry, computer vision and graphics, robotics and animation, motion planning. Case studies of existing applications: drug design, graphic animation, medical surgery, CAD/CAM.

3 units (Guibas, Latombe) not given 1997-98

99C. Stanford Introductory Seminar: Computers: Fact and Fiction—The question of what computers can and cannot do. Popular culture and the media represent the capabilities of computers in an unscientific way that tends to obscure the promise and the limitations of the technology. Scientists have disagreed about the range of tasks that computers can deal with and that computers cannot learn to do what they were not explicitly programmed to do (e.g., play championship chess or create art or music). Conversely, extremely optimistic forecasts and claims have also been made. Seminar encourages students to evaluate the relationship between these claims and the current and future state of technology. Prerequisite: 106A.

3 units (Koller) not given 1997-98

99D. Stanford Introductory Seminar: The Science of Art—Preference to freshmen. From the Renaissance to the 19th century, revolutions in science and mathematics have inspired parallel revolutions in the visual arts (e.g., Brunelleschi’s invention of linear perspective, Newton’s discoveries in geometric optics, and the theories of color vision proposed by Goethe, Young, Helmholtz, etc.). Modern physics has added a precise understanding of the interaction of light and matter. Computers have the ability to experimentally verify these principles by creating images (digital image synthesis). The scientific principles behind image making. The interwoven histories of science and art. Using graphics workstations and commercial software packages, experiments are performed in image making.

3 units, Win (Levoy)

99E. Stanford Introductory Seminar: Algorithms at Work—Preference to sophomores. Introduces key ideas in practical algorithm design in a painless manner, emphasizing ideas and applications, and deemphasizing analysis/proofs. Implementations use applets. Examples of algorithms: local search, random sampling and random-number generation, hashing, pattern matching, data compression, clustering, and basic cryptography. Each module is based on a central theme, with examples of the theme, and exercises that extend the theme and result in an implementation with clearly-evident practical application. Prerequisite: 109

3 units (Motwani, Raghavan) not given 1997-98

99F. Stanford Introductory Seminar: Paradox—Bug or Feature?—Preference to freshmen. Conflict in thought is as inevitable as in territory and relationships. The discovery, influence, and use of paradoxes in mathematics, logic, nature, cognition, and computation. The paradoxical continuum: Zeno, Democritus, Newton, Leibniz, Cohen, Itano. Logical paradoxes: Eubulides’ liar, the set of all sets, incompleteness of arithmetic, the halting problem. Paradoxes in nature: quantum mechanics, chaos. Cognition: mind-body interaction, free will, and
106A. Programming Methodology—For students in technical disciplines; no prior experience is assumed. Broad introduction to the engineering of computer applications, emphasizing software engineering principles: design, decomposition, information hiding, procedural abstraction, testing, and reusable software components. Uses the programming language C and concentrates on the development of good programming style and on understanding the basic facilities provided by the language. Alternatives: 105, 106X. GER:2b (DR:6)

*5 units, Aut (Roberts)
Win (Plummer)
Spr (Staff)

106B. Programming Abstractions—Abstraction and its relation to programming. Software engineering principles of data abstraction, modules, certain fundamental data structures (e.g., stacks and queues), and data-directed design. Recursion and recursive data structures (linked lists and binary trees). Brief introduction to time and space complexity analysis. Prerequisite: 106A or consent of the instructor, based on prior exposure to ANSI C. GER:2b (DR:6)

*5 units, Aut (Staff)
Win (Plummer)
Spr (Staff)

106X. Programming Methodology and Abstractions (Accelerated)—Covers most of the material in 106A,B. Students are expected to have previous programming experience at a level that allows them to understand the concepts presented in 106A, usually in a language other than C. First two weeks focus on understanding how the concepts are expressed in ANSI C. 106B material is covered for the balance. Students who completed 106A enroll in 106B. 106X can be taken after 106A only with consent of instructor. GER:2b (DR:6)

*5 units, Aut (Staff)
Win (Staff)
Spr (Staff)

107. Programming Paradigms—Introduces a variety of programming language paradigms and their implementations. Topics: structure and implementation of compiled languages, basic concurrent programming, the functional paradigm, and the object-oriented paradigm. Substantial programming projects. Prerequisite: 106B or 106X.

*5 units, Aut, Spr (Zelenski)

108. Object-Oriented Systems Design—The implementation of modern software based on large OOP libraries. Topics: review of C++, the structure of object-oriented Graphical User Interface (GUI) class libraries, GUI application design and construction, OOP software engineering strategies, approaches to programming in teams. Prerequisite: 107.

*4 units, Aut, Win (Parlante)

109. Introduction to Computer Science—The mathematical and theoretical foundations of com-
puter science. Topics: logic, proof techniques, recursion and recurrence relations, analysis of algorithms, combinatorics, basic data models (sets, relations, linear models, trees and graphs), and introductory computer theory. Prerequisite: 106B or 106X. GER:2b (DR:6)

4 units, Aut, Win (Johnson)

109B. Introduction to Computer Science—Last time offered. Continuation of 109. Topics: graph algorithms, finite automata and regular expressions, context-free grammars, propositional and predicate logic. Proof techniques, modeling, and abstraction are sequence themes. Functional programming exercises explore and exemplify these concepts. Prerequisite: 109A.

*4 units, Aut (Staff)

110. Introduction to Computer Systems and Assembly Language Programming—Organization of digital computers, buses, registers, processors, I/O, memory systems, and paged memory. Data representation, data structures, and computer arithmetic. Instruction sets and execution; addressing modes. Assembly language programming, including subroutines, co-routines, interrupts, and traps. Operating systems issues and principles of storage management; combines general principles and practice in implementations. Prerequisite: 106B or 106X.

*4 units, Spr (Chou)

112. Computer Organization and Design—(Enroll in Electrical Engineering 182.)

4 units, Aut, Win

114. Introduction to Artificial Intelligence—Introduces majors in computer science, symbolic systems, computer systems engineering, and technical subjects to artificial intelligence (AI). Students taking additional courses in AI should enroll in 221. First half topics: detailed technical exposition of AI fundamentals: search, logic, knowledge representation, reasoning, planning, learning, and uncertainty. Second half topics: frontier applications of these ideas (e.g., expert systems, rule-based reasoning, natural language processing, information retrieval, intelligent database access, and data mining); technical aspects of “scaling up” the fundamental approaches to confront real-world applications. Prerequisite: 109.

3 units, Spr (Nilsson)

137. Introduction to Scientific Computing—The fundamental issues of numerical computation for the mathematical, computational, and physical sciences, and engineering. Emphasis from the perspective of the computer scientist. Use of numerical algorithms in engineering practice. Problems of accurately computing solutions in the presence of rounding errors and of computing discrete approximations of solutions which are defined on the continuum. The taxonomy of problem classes with methods for their solution and principles useful for analysis of performance and algorithmic development. Topics: error analysis, the solution of linear and nonlinear equations, interpolation and numerical differentiation, the approximation of integrals, and the solution of differential equations. Prerequisites: 106A; Math. 103 or 113 or equivalents.

*4 units, Aut (Golub)
Spr (Lamba)
Sum (Staff)

143. Compilers—Principles and practices in the design of programming language compilers. Topics: lexical analysis, parsing theory (LL, LR, and LALR parsing), symbol tables, type checking, common representations for records, arrays, and pointers, runtime conventions for procedure calls, storage allocation for variables, and generation of unoptimized code. Students construct simple compiler as programming project. Prerequisites: 107, 109.

*4 units, Aut (Johnson)
Spr (Dill)

145. Introduction to Databases—Object-oriented, entity-relationship, and relational data models. Relational and object-oriented database query languages. SQL and ODMG standards. Algebraic and logical query languages. Integrity constraints and triggers; functional dependencies and normal forms. Database transactions and security from the application perspective. Designing a database for an application. Interactive and programmatic interfaces to database systems. Individual database application programming project with extensive use of SQL. Prerequisites: 107, 109.

*4 units, Aut (Johnson)
Spr (Dill)

147. Introduction to Human-Computer Interaction Design—Introduction to the concepts underlying the design of human-computer interaction: usability and affordances, direct manipulation, systematic design methods, user conceptual models and interface metaphors, design languages and genres, human cognitive and physical ergonomics, information and interactivity structures, design tools and environments. Structured around a set of case studies in which notable interface designs and/or projects are analyzed as illustrative of underlying principles. Students participate in discussions of cases and do weekly interface analysis and design exercises which do not require programming. Enrollment limited. Class sign-up required.

3-4 units, Aut (Winograd)

148. Introductory Computer Graphics—For undergraduates; M.S. students or students with a strong interest in continuing in graphics take 248. Introduction to two- and three-dimensional computer graphics. Topics: fundamentals of input and display devices, scan conversion of geometric primitives, two- and three-dimensional transformations and clipping, windowing techniques, curve fitting, three-dimensional viewing and perspective, hidden sur-
face removal, and illumination models. Emphasis on the mathematical and geometric tools used in computer graphics. Programming is done on Macintosh using Open GL and C.

Prerequisites: 107, Math. 103.

3 units, Spr (Johnson)


*4 units, Spr (Staff)


4 units, Aut (Boneh)

154N. Introduction to NP Completeness—Turing machines: equivalent forms, undecidability. Nondeterministic Turing machines: properties, the class NP, complete problems for NP, Cook’s theorem, reducibilities among problems. Students participate in approximately the last half of 154. Prerequisite: a knowledge of formal languages and automata as in the first part of 154.

2 units, Aut (Boneh)

Spr (Motwani)


3 units, not given 1997-98

157L Logic and Automated Reasoning Laboratory

1 unit


*4 units, Aut (Plotkin)

Spr (Guibas)

191. Senior Project—Group or individual projects under faculty direction. Register using the section number associated with the instructor.

1-6 units, any quarter (Staff)

191W. Writing Intensive Senior Project—Group or individual projects under faculty direction. Register using the section number of an Academic Council member. (WIM)

1-6 units, any quarter (Staff)

192. Programming Service Project—Restricted to Computer Science students. Appropriate academic credit (without financial support) is given for volunteer computer programming work of public benefit and educational value.

1-3 units, any quarter (Staff)

193D. C++ and Object-Oriented Programming—C++ programming language and object-oriented programming paradigm. Covers all the major features of C++ 3.0 and object design principles which apply generally in Object Oriented Languages. Intensive programming assignments. Prerequisites: knowledge of C and basic programming methodology as developed in 106B or 106X.

3 units, Win (Staff)


3 units, Spr (Parlante)

* May be taken for 3 units by graduate students.
193J. Programming in Java—Hands-on experience. Topics: object-oriented programming (classes, objects, messaging, inheritance), Java language features (interfaces, exceptions, packages, concurrency, garbage collection), use of the built-in packages (lang, util, io, networking, awt), understanding applications and applets, security and verification, Java implementation and the virtual machine. Intensive programming assignments. Prerequisite: knowledge of C language and programming experience at the level of 106BX.

3 units, Win (Zelenski)

193L. Programming in LISP—Introduction to problem solving in the LISP language, focusing on the functional programming paradigm. Topics: recursion, list manipulation, mapping, functional arguments, destructive processing, macros, I/O, Lisp implementation, environments, packages, efficiency, object-oriented programming, classes, and methods. Term project. Prerequisite: 106B or 106X, or equivalent.

3 units, Spr (Staff)

193U. Software Engineering in C—C programming language and UNIX/C programming environment. C programming language issues: data types, control structures, pointers, dynamic memory allocation, libraries, performance, bit operations, and the interface to the UNIX shell. UNIX systems programming issues: file system, processes, signals, interprocess communication, and C interfaces to these capabilities. Includes a significant programming project. Prerequisite: knowledge of programming at the level of 106B, experience in a high-level language other than BASIC and as a UNIX user.

3 units, Win (Staff)

194. Software Project—Student teams complete a significant programming project through the phases of specification, coding, and testing under faculty supervision. Lectures on software engineering methodologies. Prerequisite: 108. (WIM)

3 units, Spr (Roberts, Plummer)

195A. Software Engineering—Introduction to the field of software engineering as preparation for going into industry. Topics: writing up client requirements, developing specifications and designs, establishing testing protocols, and how to do usability tests. Principles of interface design, project management, metrics, quality control and ISO 9000 certification. Students experiment with software development models. Some programming in C++ required in exercises. Teams write documentation and design for a major project. Prerequisite: 108 or consent of instructor.

3 units, not given 1997-98

195B. Software Engineering Application—Student teams develop major programming project designed in 195A and have the option of forming new groups. Expertise in software engineering is assumed and teams abide by the highest industry standards of software development. Intensive discussions with the instructor and between groups. Prerequisite: 195A.

3 units, not given 1997-98

196. Microcomputer Consulting—Overview of computer consulting, focusing primarily on the Macintosh and IBM-compatible systems. Topics: operating systems, networks, communications, multimedia, and consulting style. Biweekly lectures discuss computing environments on and off campus. Students work as consultants at a computer cluster and in the residences. Prerequisite: 1C.

2 units, Aut, Spr (Staff)

197. Mainframe and Workstation Computer Consulting—Computer consulting in a mainframe and workstation environment, focusing on the UNIX operating system under the SUN and DEC hardware systems. Topics: UNIX fundamentals, systems administration, shell scripting, VI, Emacs, networking, e-mail, and X-windows. Students work as on-duty consultants at the Sweet Hall computer cluster. Pre- or corequisite: 1U.

2 units, Win, Spr (Staff)

198. Teaching of Computer Science—Teach a small discussion section of 106A while learning the fundamentals of teaching a programming language at the introductory level. Two workshops/one general meeting weekly on introductory material in general, 106 specifically, and teaching techniques. Application and interview required; see the 198 coordinator in CS for information. Prerequisite: 106B or 106X.

4 units, Aut, Win, Spr (Roberts, Ingersoll, Miller)

199. Independent Work—Special study under faculty direction, usually leading to a written report. Letter grade given; if this is not appropriate, enroll in 199P. Register using the section number associated with the instructor.

any quarter (Staff)

199P. Independent Work—Like 199, but graded Satisfactory/No Credit.

any quarter (Staff)

UNDERGRADUATE
AND GRADUATE

200. Undergraduate Colloquium—Strongly recommended for junior-year CS majors as a way to build contacts with faculty. Weekly presentations by faculty and people from industry who informally describe their views of computer science as a field and their experience as computer scientists. (AU)

1 unit, Aut (Staff)

201. Computers, Ethics, and Social Responsibility—Primarily for majors entering computer-related fields. Analysis of ethical and social issues
related to the development and use of computer technology. Introduction to relevant background in ethical theory, and social, political, and legal considerations. Analysis of scenarios in specific problem areas: privacy, reliability and risks of complex systems, and the responsibility of professionals for the applications and consequences of their work. Prerequisite: 106B or 106X. (WIM)

3 units, Win (Roberts)

202. Law for Computer Science Professionals—
Equips computer science professionals with the information and framework to make law-related decisions affecting their work while remaining full participants in design or development decision-making when these legal issues arise. Problem-oriented. Topics: signing invention assignment and nondisclosure agreements, protecting intellectual property, distinguishing between independent contractors and employees, and negotiating software development and publishing agreements.

1 unit, Win (Heckman)

203. Self-Directed Research—
Students discuss, learn about, and perform self-directed research. Defining criteria for success, leveraging off of existing work, finding sponsors, maintaining motivation, obtaining feedback, dealing with procrastination, and individually determining the best strategy for successful research.

3 units, not given 1997-98

205. Mathematical Methods for Robotics and Vision—
Overview of some of the mathematical background necessary for research in robotics and vision. Topics: geometric meaning of linear algebra concepts; dynamic systems and stochastic estimation (Kalman filtering); calculus of variations; vector calculus; numerical methods for partial differential equations. Additional topics depending on interest. Prerequisites: 106B or X, Math. 43 and 113, or equivalents.

3 units, Aut (Tomasi)

206. Applied Electronic Commerce—
As the internet and wide-area networks are increasingly used to conduct commerce, computer scientists need to understand the nature of economic mechanisms such as auctions, and to devise ways in which to implement them efficiently. Relevant economic theories. Lab in which students design and implement a substantial application in small groups. Prerequisites: sufficient mathematical maturity to follow basic combinatorial and probabilistic arguments, and ability to code in either C++ or Java.

3 units, Spr (Shoham)

211. Logic Design—
(Enroll in Electrical Engineering 275.)

3 units, Aut, Win

212. Computer Architecture and Organization—
(Enroll in Electrical Engineering 282.)

3 units, Win

212H. Computer Architecture and Organization (Honors)—(Enroll in Electrical Engineering 282H.)

3 units, Aut

221. Artificial Intelligence: Principles and Techniques—
Broad technical introduction to core concepts and techniques in artificial intelligence. Topics: search, planning, knowledge representation, managing uncertainty, machine learning, neural networks, vision, robotics, natural language understanding, and intelligent architectures. Prerequisites: 109,157 or Philosophy 160A, and exposure to basic concepts in probability.

3 units, Aut (Koller)

222. Knowledge Representation—
Declarative knowledge representation methods in artificial intelligence. Topics: time and action, nonmonotonic logics, causality, inheritance and description logics, ontologies, contexts, knowledge reformulation, multiple views, abstraction, deduction vs. abduction, knowledge and other mental attitudes. Prerequisites: basic familiarity with logic. Recommended: prior exposure to artificial intelligence as in 121/221.

3 units, Aut (Fikes)

223A. Introduction to Robotics—
Topics: manipulator kinematics and inverse kinematics; manipulator dynamics, motion, and force control; motion planning and robot programming. Recommended: knowledge of matrix algebra.

3 units, Win (Khatib)

223B. Introduction to Computer Vision—
Fundamental issues and techniques of computer vision. Image formation, edge detection and image segmentation, shading, texture, stereo, motion, shape representation, recognition. Project. Prerequisites: 106B or X, Math. 43 and 113, or equivalents.

3 units, Win (Tomaso)

224. Robot Programming Laboratory—
Hands-on introduction to the techniques of robot programming for robotics and non-robotics students. Series of guided exercises in which students program mobile robots to exhibit increasingly complex behavior (simple dead reckoning and reactivity, planning and map building, communication and cooperation). Topics: basics of motor control and sensor characteristics; sensor fusion, model construction, and robust estimation; control regimes (fuzzy control and potential fields); active perception; reactive planning architectures; various topics in sensor-based control, including vision-guided navigation. Student programmed robot contest. Programming is in C on Unix or Windows machines; course work done in teams. Prerequisites: C programming ability.

3-5 units, Win (Konolige)

225. Experimental Robotics—
Hands-on experience with robotic manipulation and navigation sys-
226. Knowledge-Based Systems and Applications—Knowledge-based (expert) system technology is the most widely-used application technology to emerge from AI. Topics: basics of KBS and ES; tech transfer from research to industry; knowledge engineering, KB programming, knowledge acquisition methodology; evolution of the technology as applied to business and government problems, current and future impact. Case studies, readings. System building project possible. Some guest lectures.

3 units, Spr (Khatib)

227. Reasoning Methods in AI—Technical presentation of algorithmic techniques for problem solving in AI. Combines formal algorithmic analysis with description of recent applications. Topics: search and real-time search, constraint satisfaction, planning, robot motion planning, logical deduction, abstraction and approximation. Focuses on recent results. Prerequisites: familiarity with the basic notions in data structures and design and with techniques in design and analysis of algorithms. Recommended: previous or concurrent course in AI.

3 units (Koller) not given 1997-98

227L. Reasoning Methods in AI Laboratory
1 unit (Staff)

228. Knowledge Representation and Reasoning under Uncertainty—Modeling (knowledge representation) languages suitable for dealing with an uncertain world, focusing on probabilistic models including hidden Markov models, probabilistic context free grammars, Bayesian belief networks, influence diagrams, and Markov decision processes. Syntax, probabilistic semantics, inference, and learning algorithms for these frameworks. Recent applications to domains (speech recognition, medical diagnosis, data mining, statistical text modeling, and robot motion planning). Prerequisites: understanding of basic concepts in probability theory and in design and analysis.

3 units, Win (Koller)

229. Machine Learning—Survey of major research areas: inductive learning, explanation-based learning, and genetic algorithms. Topics: neural networks, decision trees and graphs, delayed-reinforcement and temporal-difference learning, and computational learning theory. Focuses on the underlying concepts and the role of machine learning in AI. Representative systems described. Prerequisites: 221 or consent of instructor, and ability to write computer programs in one or more commonly used languages.

3 units, Spr (Koller)

237. Advanced Numerical Analysis—Three-quarter graduate sequence designed to acquaint students in mathematical and physical sciences and engineering with the fundamental theory of numerical analysis. Examples from applications.

237A. Numerical Linear Algebra—Solution of systems of linear equations: direct methods, error analysis, structured matrices; iterative methods and least squares. Parallel techniques. Prerequisites: 106A, 137, Math. 103 or 113.

3 units, Aut (Golub)


3 units, Win (Oliger)


3 units, Win (Lamba)

240A. Operating Systems and Systems Programming—Fundamentals of operating systems design and implementation. Basic structure; synchronization and communication mechanisms; implementation of processes, process management, scheduling, and protection; memory organization and management, including virtual memory; I/O device management, secondary storage, and file systems. Prerequisite: 108. Recommended: Electrical Engineering 182.

*4 units, Aut, Win (Rosenblum)

240B. Advanced Topics in Operating Systems—Advanced study in OS topics and exposure to recent developments in OS research. Readings/lectures on classic and new papers. Topics: virtual memory management, synchronization and communication, file systems, protection and security, operating system extension techniques, fault tolerance, and history and experience of systems programming. Prerequisite: 240A or equivalent.

3 units, Win, Spr (Baker)

242. Programming Languages—Basic elements of programming languages and programming paradigms: functional, imperative, and object-oriented. Introduction to formal semantic methods. Modern
type systems, higher-order functions and closure, exceptions and continuations. Runtime support for different language features. Emphasis is on separating the different elements of programming languages and styles. First half uses Lisp and ML to illustrate concepts; second half a selection of object-oriented languages. Prerequisite: 107, or experience with Lisp, C and some object-oriented language.

3 units, Aut (Mitchell)

243. Advanced Compiling Techniques—Theoretical and practical aspects of building modern compilers. Topics: intermediate representations, basic blocks and flow-graphs, dataflow analysis, register allocation, global code optimizations, and interprocedural analysis. Prerequisite: 143 or equivalent.

*4 units, Win (Staff)

244A. Introduction to Computer Networks—Structure and components of computer networks; functions and services; packet switching; layered architectures; ISO’s Open Systems Interconnections (OSI) reference model; physical layer; data link layer; error checking; window flow control; media access control protocols used in local area networks (Ethernet, Token Ring, FDDI) and satellite networks; network layer (datagram service, virtual circuit service, routing, congestion control, IP); transport layer (UDP, TCP); session layer; applications.

3 units, Aut (McKeown)

244B. Distributed Systems—Coverage of distributed operating systems and applications issues with an emphasis on high-level protocols as the key technology. Topics: distributed shared memory, object-oriented distributed system design, distributed directory services, atomic transactions and time synchronization, file access, process scheduling, process migration and remote procedure call, focusing on distribution, scale, robustness in the face of failure, and security. Prerequisites: 240B, 244A.

3 units, Spr (Cheriton)

244C. Distributed Systems Project—Companion project option for students taking 244B. Corequisite: 244B.

3-6 units, Spr (Cheriton)


3 units, Win (Garcia-Molina)

245B. Database System Implementation—A major database system implementation project realizes the principles and techniques covered in earlier courses. Each student independently builds a complete database management system, from file structures through query processing, with a personally designed feature or extension. Lectures cover project details, advanced techniques in database system implementation with a focus on query processing and optimization, and guest speakers from industry on commercial DBMS implementation techniques. Prerequisites: 145, 245A. Recommended: programming experience in C++.

*5 units, Aut (Widom)

246. Cognitive and Perceptual Principles and Methods for Human-Computer Interaction—Results and methodologies in the cognitive sciences can be applied to understand the ways people think about activities, reason, remember, and perceive auditory and visual stimuli. Surveys practical aspects of the cognitive sciences and applies them to problems in human-computer interaction (HCI). Readings/assignments highlight the literature and methodologies with high “bang for the buck” for HCI. When and how different areas of the cognitive sciences are likely to be useful (or not be useful) in design. Enrollment limited.

3 units, Win (Strub)

247A. Human-Computer Interaction: Interaction Design Studio—Students work individually and in small teams to design and prototype artifacts in a prototyping system such as Director. Mutual analysis of these different designs by students, developing design skills and judgment. Project includes substantial user-interface prototypes of systems for situations of actual use, applying concepts from readings and interacting in project reviews with faculty and experienced system designers. Topics: functionality and usability, visual design and aesthetics, metaphors and scenarios, brainstorming and rapid prototyping. Enrollment limited. Prerequisite: 147.

3 units, Win (Staff)

247B. Human-Computer Interaction: Contextual and Organizational Issues—Analysis and design of human-computer interaction from a situated perspective, including the interpersonal, social, and organizational contexts that shape the process and effectiveness of designing, implementing, and using computer systems. Instructor and guest lecturing; materials from multiple disciplines concerning computer systems design, implementation, use, and organizational design. In-class exercises, and presentations, and individual and group fieldwork on extended field project. Enrollment limited. Prerequisite: 147.

3 units, Spr (Winograd)

248. Introduction to Computer Graphics—Fundamentals of input, display, and hardcopy devices, scan conversion of geometric primitives, 2D and 3D geometric transformations, clipping and windowing
scene modeling and animation, algorithms for visible surface determination, introduction to local and global shading models, color, and photorealistic image synthesis. Written assignments and programming projects. Prerequisites: 108, Math. 103.

*4 units, Win (Hanrahan)

249. Object-Oriented Programming from a Modeling and Simulation Perspective—Object-oriented programming techniques and issues, emphasizing programming as modeling and simulation. Topics: encapsulation, use of inheritance (including multiple inheritance), collections, run-time typing identification, exception handling (and possibly persistence), some aspects of distributed and parallel object-oriented systems. Role of programming conventions/style/restrictions in surviving object-oriented programming for class libraries and programming-in-the-large; general techniques for object-oriented programming. Prerequisites: knowledge of C and basic programming methodology as developed in 106B or 106X; 107; basic knowledge of C++; may be taken concurrently. Recommended: 193D.

3-5 units, Win (Cheriton)


3 units, Aut (Staff)

256L. Formal Methods for Concurrent and Reactive Systems Laboratory

2 units, Aut (Staff)

257. Automated Deduction and its Applications—Proving theorems and extracting information from proofs. Uses in software engineering (program specification, synthesis, and verification) and artificial intelligence (commonsense and robotic planning, natural-language understanding). Foundations of logic programming. Deductive tableaux, nonclausal resolution, skolemization, building theories into unification and inference rules, term rewriting, inductive theorem proving. The design of theorem provers. Prerequisite: 157.

3 units (Staff)

258. Introduction to Programming Language Theory—Syntactic, operational, and semantic issues in the mathematical analysis of programming languages. Type systems and non-context-free syntax. Universal algebra and algebraic data types. Operational semantics given by rewrite rules; confluence and termination. Scott-semantics for languages with higher-type functions and recursion. Treatment of side-effects. Prerequisites: 154, 157 or Philosophy 160A.

3 units, Win (Mitchell)


3 units (Staff) not given 1997-98


3 units, Win (Plotkin)

270. Computer Applications in Medicine—(Same as Medical Information Sciences 210.) Survey of use of computers in the medical field, including a variety of research and applied environments and the factors that influence the acceptance of these applications. Topics: integration of computer systems in the medical center, hospital information systems, electronic medical records and networking, bibliographic search, applications to molecular biology, aids for disabled patients, image processing, computer-aided instruction, decision support systems.

3 units, Aut (Fagan, Shortliffe)

271. Computer-Assisted Medical Decision Making—(Same as Medical Information Sciences 211.) For undergraduates or graduate students. Overview of concepts in medical decision making and survey of methods for the implementation of such concepts in computer-based clinical decision-support tools. Emphasis on Bayesian statistics, decision analysis, neural networks, artificial intelligence/expert systems, belief networks, and the synergies among such approaches. Prerequisite: at least one programming course.

3 units, Win (Shortliffe)

272. Medical Informatics Project Course—(Same as Medical Information Sciences 212.) For students who have completed 270, 271 or 274, and who wish to implement those ideas in a computer program. Prerequisites: programming experience, 270, 271, or 274.

3 units, Spr (Fagan)

274. Representations and Algorithms for Molecular Biology—(Same as Medical Information Sciences 214.) Introduction to basic computational issues and methods used in molecular biology, including access and use of biological data sources on World-Wide-Web. Topics: basic algorithms for
alignment of biological sequences and structures, and advanced representational and algorithmic issues in structure and sequence computation (e.g., dynamic programming algorithms for alignment, structural superposition algorithms, simplified representations, probabilistic representations of structural uncertainty, hidden Markov models, Bayesian networks, statistical feature detection, genetic algorithms, constraint satisfaction, minimum description length encoding, and knowledge-based approaches.) Some guest lectures on computational approaches pursued by research groups at Stanford. Prerequisites: programming skills, Math. 103. Recommended: familiarity with biology.

4 units, Spr (Altman, Koza)

290. Research Seminar on the Software Industry—Graduate students given priority. The present state and dynamics of the worldwide software industry, it's growth and current structure, key companies, important trends shaping its development, and issues in the future (human resources, government regulation, intellectual property rights, software development and quality, international competitiveness, new technologies and markets, etc.) Research of the past year in the Japanese and the American software industries. Students participate in research, literature reviews, and interviews with industry experts. Research paper. Enrollment limited to 20. Prerequisite: consent of instructor.

3 units (Staff)

298. Seminar on Teaching Introductory Computer Science—Opportunity for faculty and undergraduate and graduate students who are interested in teaching to discuss the strategy and tactics of teaching computer science at the introductory level. Enrollment limited to 15. Prerequisite: consent of instructor.

1-3 units, Aut (Roberts)

PRIMARY FOR GRADUATE STUDENTS

300. Departmental Lecture Series—For first-year Computer Science Ph.D. students. Weekly presentations by members of the department faculty, each describing informally his or her current research interests and views of computer science as a whole. (AU)

1 unit, Aut (Staff)

309. Industrial Lectureships in Computer Science—The department invites an outstanding computer scientist to give a course in his/her specialty. Lecturers and topics change yearly; courses may be taken repeatedly. See Time Schedule for offerings.

3 units

312. Processor Design—(Enroll in Electrical Engineering 382.)

3 units, Win


3 units, Spr (Gupta)

315B. Parallel Programming Project—Continuation of 315A. A significant parallel programming project is required using shared-memory, message-passing, or data-parallel machines. Lectures on parallel programming languages and their implementation, performance debugging of parallel programs, parallel data structures and algorithms. Prerequisite: 315A or consent of instructor.

3 units (Gupta)

316A. Logic Synthesis of VLSI Circuits—(Enroll in Electrical Engineering 318.)

3 units, Win (DeMicheli)

316B. Computer-Aided System Design Laboratory—(Enroll in Electrical Engineering 319.)

3 units, Spr (DeMicheli)


3 units, alternate years, not given 1998-99

318. Testing Aspects of Computer Systems—(Enroll in Electrical Engineering 488.)

3 units, alternate years, given 1998-99

319. Topics in Digital Systems—Advanced material is often taught for the first time as a "topics" course, perhaps by a faculty member visiting from another institution. Students may therefore enroll repeatedly in a course with this number. See Time Schedule for topics currently being offered.

by arrangement

320. Interactivity, Narrative, and Artificial Intelligence—(Same as English 295.) Theory of and approaches to interactive narrative systems, especially those that incorporate artificial intelligence techniques. Weekly meetings include: invited lecturers, discussion readings, critical review of CD ROM titles and other implemented systems. Students create prototypes of AI-based interactive story systems.

2 units (Hayes-Roth, Friedlander)

not given 1997-98

323. Nonmonotonic Common Sense Reasoning—Formalizing common sense knowledge and reasoning using situation calculus with nonmonotonic logics, especially circumscription. Variations of situation calculus. Formalizing context. Formaliz-
327. Numerical Methods for Initial Boundary Value Problems—Initial boundary value problems

326A. Motion Planning—For students interested in computer graphics, geometrical computing, robotics, and/or artificial intelligence. Computing object motions is central to many application domains (e.g., design, manufacturing, robotics, animated graphics, medical surgery, drug design). Basic path planning methods generate collision-free paths among static obstacles. Extensions include uncertainty, mobile obstacles, manipulating movable objects, and maneuvering with kinematic constraints. Configuration space is a unifying concept, geometric arrangements are a basic combinatorial structure. Theoretical methods with applications in various domains: assembly planning, radiosurgery, graphic animation of human figures.

3 units, Win (Latombe)


3 units, Spr (Kuffner)

327A. Advanced Robotic Manipulation—Topics: redundant manipulators, robot motion/force control; kinematic singularities; inertial properties, dynamic performance, and robot design; macro/mini manipulator systems; mobile manipulator platforms; cooperative robots; sensor-based primitives, artificial potential field and force strategies. Prerequisites: 223A, consent of instructor.

3 units, Golub not given 1997-98

325. Planning Methods in Artificial Intelligence—Introduction to AI methods for planning actions to achieve a specified goal from an initial state of the world. Linear planning (means-ends analysis, goal regression), non-linear planning, hierarchical planning, and compromise-based planning. Planning with temporal constraints. Reactive planning and deliberative architectures. Interaction with execution and learning. Underlying problems—frame, qualification, prediction, and persistence; notions, e.g., interdependent subgoals, reviewed and analyzed. Two parts: the basics illustrated with simple examples, and applications in various domains (robotics, process planning, etc.). Prerequisite: 221.

3 units, not given 1997-98

327B. Real-World Autonomous Systems—Complement to 224. Theory and hands-on lab using small mobile robot platforms operating in real-world environments. Topics: basics of motor control and sensor characteristics; sensor fusion, model construction, and robust estimation; control regimes (fuzzy control and potential fields); active perception; reactive planning architectures; various topics in sensor-based control, including vision-guided navigation. Prerequisites: 106B or X or equivalent, Math. 43 and 113 or equivalents, and an acquaintance with probability theory and statistics.

3 units, not given 1997-98

328. Topics in Computer Vision—Fundamental issues and mathematical models for computer vision. Possible topics: image formation, edge detection and image segmentation, shading, texture, stereo, motion, shape representation. Student papers and project. Prerequisites: 106B or X, Math. 43 and 113, or equivalents.

3 units, Spr (Tomasi) alternate years, not given 1998-99

329. Topics in Artificial Intelligence—Advanced material is often taught for the first time as a "topics" course, perhaps by a faculty member visiting from another institution. Students may therefore enroll repeatedly in a course with this number. See Time Schedule for topics currently being offered.

Agent Architectures—Theory and design of computational architectures within which the individual components required for intelligence can be integrated into a coherent, functioning whole. Readings and seminar-style discussions address general principles of the architectures, and cognitive, robot, and reactive architectures. Diverse sample of specific prominent and influential architectures, including Soar, AIS/BB1, Prodigy, Subsumption, ATLANTIS, RCS, etc. Tough scientific and methodological issues facing the field including reproducibility, comparisons, and architecture evaluation. See http://www-cs-students/~kpdfeg/ cs329/. Prerequisite: 221 or consent of instructor.

3 units, Aut (Pfleger)


3 units, Golub not given 1997-98
are solved in different areas of engineering and science modeling phenomena, e.g., wave propagation and vibration, fluid flow, etc. Numerical techniques for such simulations are discussed in the context of applications. Emphasis is on stability and convergence theory for methods for hyperbolic and parabolic initial boundary value problems, and the development of efficient methods for these problems.

3 units Spr (Oliger)

338. Numerical Analysis of Dynamical Systems—
(Enroll in Mechanical Engineering 233B.)
3 units (Stuart) given 1998-99

339. Topics in Numerical Analysis—Advanced material is often taught for the first time as a "topics" course, perhaps by a faculty member visiting from another institution. Students may therefore enroll repeatedly in a course with this number. See Time Schedule for current topics.

Parallel Methods in Numerical Analysis—Recent developments in parallel computer technology have made it necessary to reformulate numerical algorithms to exploit the full potential of this technology. Emphasis is on different techniques for obtaining maximum parallelism in various numerical algorithms, especially those occurring when solving matrix problems and partial differential equations, and the subsequent mapping onto the computer. Implementation issues on parallel computers. Prerequisite: familiarity with linear algebra, ordinary differential equations, and partial differential equations.

3 units, alternate years, given 1998-99

341. Advanced Topics in Data Communication—Readings/discussion are combined with topical lectures to familiarize students with a core of classic and new papers in the field of data networking. Emphasis is on understanding and applying existing work to new problems in the field, especially high-speed networking. Classes alternate between discussion sections and lectures. Topics: network theory (the end-to-end argument), transport protocol performance (header prediction, checksum efficiency), cell relay (e.g., ATM and SONET), congestion control (Parekh's thesis, leaky bucket, fair queueing) and high-speed switching (input vs. output queueing, crossbars and banyans). Prerequisite: 244A.

3 units (Partridge)
alternate years, not given 1998-99

342. Programming Language Design—Problems of programming language design and comparison of traditional solutions. Possible topics: formal semantics, implementation considerations, extensibility, very high level languages, evaluation of language designs, the innovative features of a variety of modern programming languages. Prerequisites: 242, 243.

3 units (Mitchell)

343. Topics in Compilers—Advanced topics in compilers. Topics change every quarter; course may be taken repeatedly for credit. Prerequisite: 243.

3 units (Lam) not given 1997-98

344. Projects in Computer Networks—For students with a strong interest in computer networks from novel applications to physical layer coding schemes; software to hardware; theory to design-and-build. Teams of two complete a small research project of sufficient quality and interest to merit presentation at a conference, or to form the basis of a new business, e.g., studies of network traces, network traffic visualization tools, home-networking, analysis of performance of cable-modems, novel web applications, or novel router architecture. Enrollment limited to 30. Prerequisites: 244A; or Electrical Engineering 284 and 384. Recommended: 244B and Electrical Engineering 392X or 392Y.

3 units, Win (McKeown)

345. Advanced Topics in Database System—Advanced topics in the area of database and information systems. Content differs in each offering; may be taken multiple times for credit. Prerequisite: 145.

3 units, Win (Ullman)

347. Transaction Processing and Distributed Databases—Principles and system organization of distributed databases. Data fragmentation and distribution, distributed database design, query processing and optimization, distributed concurrency control, reliability and commit protocols, and replicated data management. Distributed algorithms for data management: clocks, deadlock detection, and mutual exclusion. Heterogeneous and federated distributed database systems. Overview of commercial systems and research prototypes. Prerequisites: 145, 245A.

3 units, Spr (Staff)


*4 units, Win (Guibas)

* May be taken for 3 units by graduate students
348B. Computer Graphics: Image Synthesis Techniques—Intermediate level, emphasizing sampling, shading, and display aspects of computer graphics. Topics: local and global illumination methods including radiosity and distributed ray tracing, texture generation and rendering, volume rendering, strategies for anti-aliasing and photorealism, human vision and color science as they relate to computer displays, and high-performance architectures for graphics. Written assignments and programming projects. Prerequisite: 248 or equivalent. Recommended: exposure to Fourier analysis or digital signal processing.

*4 units, Spr (Levoy)

348D. Vision and Image Processing Laboratory—(Enroll in Psychology 267.)

1-3 units, not given 1997-98

349. Topics in Programming Systems—Advanced material is often taught for the first time as a "topics" course, perhaps by a faculty member visiting from another institution. Students may therefore enroll repeatedly in a course with this number. See Time Schedule for topics currently being offered.

by arrangement

351. Topics in Complexity Theory and Lower Bounds—Focus is on one of: basic machine models and complexity measures—their properties and relationships, complexity classes and their properties, reductions and complete problems, concrete representative problems from important complexity classes. Techniques for establishing limits on the possible efficiency of algorithms, and concrete lower bounds based on the following models of computation: decision trees, straight line programs, communication games, branching programs, PRAMs, boolean circuits. Approximation algorithms and the complexity of approximations. Pseudo-randomness and cryptography. Prerequisite: 154, or equivalent.

3 units, Aut (Motwani)
alternate years, not given 1998-99


3 units, Spr (Pratt)


3 units, Aut (Pratt)

354. Probabilistic Reasoning in Computing—Basics of (Bayesian) probability theory as applied to computing and intelligence systems. Emphasis is on working through applications and understanding relevant theory. Relevant probability theory and techniques: interpretations, graphical and network models, information theory, decision theory, inference, and “alternative” approaches. Probabilistic aspects of computational problems in learning, search, data analysis, neural, and dynamic systems. Some topics by guest lecturers. Prerequisites: 106B or X, 221, a knowledge of basic statistical measures as in Psychology 60, and basic math.

3 units (Buntine, Cheeseman)
not given 1997-98

355. Automatic Formal Verification Techniques—Automatic methods for formally verifying hardware, protocol, and software system designs. Topics: state graph and automata models of system behavior. Automata on infinite strings. Linear and branching-time temporal logic. Model-checking. Modeling real-time systems. Analysis methods based on Boolean formulas, and other ways of coping with the “state explosion problem.” Exploiting abstractions. Use of decision procedures for fragments of logic to verify systems with unbounded numbers of states. Applications to circuits, algorithms, and protocols. Case studies use a variety of verification tools. Prerequisite: 154 or 254. Recommended: good understanding of basic automata and complexity theory, and undergraduate-level background in computer science.

3 units, Win (Dill)


3-5 units, Spr (Staff)
358. **Topics in Programming Language Theory**—Possible topics of current research interest in the mathematical analysis of programming languages: structured operational semantics, domain theory, semantics of concurrency, rich type disciplines, problems of representation independence, and full abstraction. May be repeated for credit. Prerequisites: 154, 157, 258, or equivalents.

3 units (Mitchell) not given 1997-98

359. **Topics in Theory of Computation**—Advanced material is often taught for the first time as a "topics" course, perhaps by a faculty member visiting from another institution. Students may therefore enroll repeatedly in a course with this number. See *Time Schedule* for topics currently being offered.

361A. **Advanced Algorithms**—Advanced data structures: union-find, self-adjusting data structures and amortized analysis, dynamic trees, Fibonacci heaps, universal hash function and sparse hash tables, persistent data structures. Advanced combinatorial algorithms: algebraic (matrix and polynomial) algorithms, number theoretic algorithms, group theoretic algorithms and graph isomorphism, online algorithms and competitive analysis, strings and pattern matching, heuristic and probabilistic analysis (TSP, satisfiability, cliques, colorings), local search algorithms.

3 units, Win (Motwani) alternate years, not given 1998-99

361B. **Advanced Algorithms**—Topics: exact and approximate algorithms for various combinational optimization problems, e.g., generalized and multicommodity flow, constrained forest problems, scheduling, and the max-cut problem multidimensional search. Linear programming; LP duality, ellipsoid dimension. Lattice reduction and strongly-polynomial algorithms.

3 units (Plotkin) alternate years, given 1998-99

365. **Randomized Algorithms**—Design and analysis of algorithms that use randomness to guide their computations. Basic tools from probability theory and probabilistic analysis that are recurrent in algorithmic applications. Randomized complexity theory and game-theoretic techniques. Algebraic techniques. Probability amplification and derandomization. Applications: sorting and searching, data structures, combinatorial optimization and graph algorithms, geometric algorithms and linear programming, approximation and counting problems, parallel and distributed algorithms, on-line algorithms, number-theoretic algorithms. Prerequisites: 161 or 261, Statistics 116, or equivalents.

3 units (Motwani) alternate years, given 1998-99

367A. **Parallel Computation**—Introduction to theoretical issues in parallel computation. Properties of parallel computation models and algorithm design techniques specific to each model, including systolic arrays, mesh-connected computers, hypercube-related networks, and PRAM. Topics: algorithms for sorting, connected components, shortest paths, and other basic problems. Upper and lower bounds for randomized and deterministic routing on hypercube and related networks. Techniques for reducing the processor-time product for PRAM algorithms.

3 units (Plotkin) not given 1997-98


3 units (Plotkin) not given 1997-98

368. **Geometric Algorithms**—Graduate-level introduction to basic techniques used in the design and analysis of efficient geometric algorithms including: convexity, triangulation, sweeping, partitioning, and point location. Voroni and Delaunay diagrams. Intersection and visibility problems. Recent developments using random sampling methods. Emphasizes data structures of general usefulness in geometric computing and the conceptual primitives appropriate for manipulating them. Impact of numerical issues in geometric computation. Applications to motion planning, visibility preprocessing, model-based recognition, and GIS. Prerequisite: 161.

3 units (Guibas) not given 1997-98

369. **Topics in Analysis of Algorithms**—Advanced material is often taught for the first time as a "topics" course, perhaps by a faculty member visiting from another institution. Students may therefore enroll repeatedly in a course with this number. See *Time Schedule* for topics currently being offered.

3 units, Spr (Plotkin)


4 units, Spr

377. **Topics in Human-Computer Interaction**—Topics of current research interest in human-computer interaction. Contents change each quarter. May be repeated for credit.

3 units

378. **Phenomenological Foundations of Cognition, Language, and Computation**—Critical analysis of theoretical foundations of the cognitive approach to language, thought, and computation. Contrast of the rationalistic assumptions of current lin-
guistics and artificial intelligence with alternatives drawn from phenomenology, theoretical biology, critical literary theory, and socially-oriented speech act theory. Emphasizes relevance of theoretical orientation to the design, implementation, and impact of computer systems as it affects human-computer interaction.

3-4 units, Win (Winograd)

379. Interdisciplinary Topics—Advanced material that relates computer science to other disciplines is often taught for the first time as a "topics" course, perhaps by a faculty member visiting from another institution. Students may therefore enroll repeatedly in a course with this number. See Time Schedule for topics being currently offered.

by arrangement

390A, B, C. Curricular Practical Training for Students with F-1 Status—Provides educational opportunities in high-technology research and development labs in the computing industry. Qualified graduate students engage in internship work and integrate that work into their academic program. Students register during the quarter they are employed and must complete a research report outlining their work activity, problems investigated, key results, and any follow-on projects they expect to perform. Meets the requirements for Curricular Practical Training for students on F-1 visas. Enroll using the section number associated with the academic adviser. 390 A, B and C may each be taken only once.

1 unit, any quarter (Staff)

393. Computer Laboratory—For graduate students of Computer Science. A substantial computer program is designed and implemented; written report required. Recommended as a preparation for dissertation research. Register using the section number associated with the instructor. Prerequisite: consent of instructor.

any quarter (Staff)

394. Business Management for Computer Scientists and Electrical Engineers—Focuses on the functional areas necessary for making successful business decisions. Topics: corporate strategy, new product development, marketing, sales, distribution, customer service, and financial accounting. How to identify and analyze issues in each of these areas in a rapidly changing world. Develops framework and tool set for formulating, evaluating, and recommending action from the general manager point of view. Develop experience in communicating and defending ideas in a team environment. Required study groups. Written case assignments. Enrollment limited to 60. See http://www-leland.stanford.edu/class/cs394/. Prerequisite: graduate student in Computer Science or Electrical Engineering.

3-4 units, Aut (Gibbons, Liddle)
Spr (enroll in Electrical Engineering 353)

395. Independent Database Project—For graduate students in Computer Science. Use of database management or file systems for a substantial application or implementation of components of database management system. Written analysis and evaluation required. Prerequisite: consent of instructor; register using the section number associated with the instructor.

any quarter (Staff)

399. Independent Project

399P. Independent Project—Graded Satisfactory/No Credit.

any quarter (Staff)

EXPERIMENTAL

409. Automated Algorithm Design—Focuses on formal tools for synthesizing correct and efficient algorithms from specifications. Topics: application domain theories, formal specifications, correctness-preserving transformation rules, representation and use of programming knowledge, algorithm and data structure design, program optimization, datatype refinement, performance analysis, and system support for program synthesis. Demonstrations of interactive development of fast algorithms, and hands-on individual projects.

3 units, Spr (Smith, Green)
alternate years, not given 1998-99

425. Artificial Life—Computational forms of artificial life exploit computer time to organize computer memory in order to survive, reproduce, evolve, and learn. Artificial life from the perspective of various tools (cellular automata, Lindenmayer systems, Turing gases, genetic algorithms, genetic programming, neural nets, and dynamical systems) and issues (evolution, learning, development, emergent behavior, spontaneous emergence of self-replicating and self-improving entities, programmable matter, algorithmic chemistry, evolutionary dynamics, universal computation at the edge of chaos, evolution of diversity, and evolution of complexity). Introductory information on molecular biology.

3 units, Win (Koza)
alternate years, not given 1998-99

426. Genetic Algorithms and Genetic Programming—The genetic algorithm is a domain independent algorithm for search, optimization, and machine learning patterned after the evolutionary processes of Darwinian survival of the fittest, genetic recombination, and occasional mutation. Genetic programming is an automatic programming technique that evolves computer programs capable of solving problems. Topics: introduction to genetic algorithms and genetic programming; mathematical basis for genetic algorithms; applications to function optimization, system identification, control, pattern recognition, classification, design of
complex structures (e.g., electrical circuits, genome and protein sequence analysis, games, economics, neural network design, robotics); genetic classifier systems; implementation on parallel computer architectures; hardware implementations; genetic classifier systems; cellular encoding; evolving assembly code and hardware.

3 units (Koza) alternate years, given 1998-99

446. Tools and Processes for Software—Specification, design, coding and acquisition, integration, operational test, maintenance, adaptation, and reuse of software. Allocation of system functions and responsibilities. Waterfall, spiral, object, domain-specific, mega, and formal design and maintenance models. Software composition. Evaluation and metrics. Future directions. Prerequisites: prior software experience; graduate standing or consent of instructor.

3 units, Aut (Wiederhold, Luckham)

447. Interdisciplinary Interaction Design Project—(Same as Mechanical Engineering 293.) Students work in small, interdisciplinary project teams to develop innovative technology prototypes to be submitted to an international student design event sponsored by Interval Research Corporation. Focuses on software and hardware interfaces, interaction, design aesthetics, and the underpinnings of successful design (a reflective, iterative design process). The group dynamics of effective interdisciplinary teamwork, and working with users.

3 units, Win, Spr (Winograd, Kelley)

448. Topics in Computer Graphics—In-depth study of an active research topic in computer graphics. Topic changes each quarter. Previous topics: exotic input and display technologies, modeling of natural phenomena, digital film making, multimedia technologies for graphics and graphics architectures. Readings from literature and a project. Course may be taken repeatedly for credit. Prerequisites: 248 or consent of instructor.

3 units, Aut, Spr (Hanrahan)

499. Advanced Reading and Research—For graduate students in Computer Science; consent of instructor required. Register using the section number associated with the instructor.

any quarter (Staff)

GRADUATE SEMINARS

510. Digital Systems Reliability Seminar—(Enroll in Electrical Engineering 385A.)

1-4 units, Aut, Win, Spr

522. Artificial Intelligence Seminar—Weekly series of informal talks on a variety of AI-related topics: new ideas, research in progress, project overviews, technology transfer, business implication, social issues. (AU)

1 unit, Win (Staff)

523. Readings in Artificial Intelligence—Primarily for students planning to take the AI qualifying exam. A series of lectures and discussions on readings in all areas of artificial intelligence research. Prerequisite: 221.

3 units, Win (Staff)

525. Seminar on Knowledge Acquisition for Expert Systems—(Enroll in Medical Information Sciences 230.)

2 units (Musen)

alternate years, given 1998-99

526. Topics in Perception—(Enroll in Psychology 266.)

1-2 units, not given 1997-98

527. Robotics Seminar—Recent research in motion planning, computer vision, manipulation, and mobile robot navigation. Invited speakers present recent results and summaries of articles from the current literature. (AU)

1 unit, Aut (Khatib)

528: Graphics/Geometry/Vision/Robotics Seminar—Weekly series of informal research talks on topics related to perceiving, modeling, manipulating, and displaying the physical world. The computational models and numerical methods underlying these topics. Brings together faculty and students in these five closely related areas.

1 unit, Aut, Win, Spr (Staff)

530. Applied Mathematics/Scientific Computing Seminar

1-3 units, Aut, Win, Spr (Staff)


1-2 units, Aut, Win, Spr (Staff)

540. Seminar on Computer Systems—(Enroll in Electrical Engineering 380.)

1 unit, Aut, Win, Spr

544. Mobile Computing Seminar—Weekly readings, discussions, and presentations on current research in mobile and wireless computing. Invited speakers from Stanford and elsewhere lecture on topics of current interest. Prerequisites: 240B, 244B. (AU)

1-2 units (Baker)

545. Database Research Seminar—Presentations of current research and industrial innovation. Emphasis on discussion and evaluation. Topics: database models, knowledge bases, high performance algorithms, large and distributed databases, application of artificial intelligence techniques to databases, and architecture of future information systems. (AU)

1 unit, Aut, Spr (Staff)

5451. Advanced Image Databases Seminar—Reading/analysis devoted to image databases as created by photographic, medical, commercial, and
artistic collections. Emphasis is on combining image-derived and textual descriptors to retrieve online images. Issues: high-dimensional feature vectors for fast retrieval, developing metrics of closeness between query and stored vectors. Applications illustrate the strengths or weaknesses of specific techniques. May be combined with a 395 project. (AU)

1 unit, Win (Firschein, Wiederhold)

547. Human-Computer Interaction Seminar—Weekly speakers on topics related to human-computer interaction design. (AU)

1 unit, Aut, Win, Spr (Winograd)

548. Distributed Systems Research Seminar—Primarily for Ph.D. students and other researchers in these areas. Recent research in distributed operating systems, computer communications, parallel machines, parallel programming, and distributed applications. Invited speakers from Stanford and elsewhere present topics and results of current interest. (AU)

1 unit, Spr (McKeown)

559. Seminar on Mathematical Theory of Computation—Possible topics (vary each year): logic and its relation to computation, programming language analysis and design, specification and verification of software and hardware systems, theories of concurrency, approaches to static analysis and program state. Invited speakers present recent results and summaries of articles from the current literature. (AU)

1 unit, Spr (Mitchell)
Acting Associate Professors: Richard Dasher, Mark McCord

Teaching Fellows: Mark Heinrich, James Kim

* On leave one or more quarters.

UNDERGRADUATE PROGRAMS

To specialize in Electrical Engineering (EE), undergraduate students should follow the depth sequence given in the discussion of undergraduate programs in the “School of Engineering” section of this bulletin.

Majors must receive at least a 2.0 grade point average (GPA) in courses taken for the EE depth requirement.

For information about an EE minor, see the “School of Engineering” section of this bulletin.

Note that a Stanford undergraduate may work simultaneously toward the B.S. and M.S. degrees. See the “School of Engineering” coterminal section of this bulletin.

GRADUATE PROGRAMS

The profession of electrical engineering demands a strong foundation in physical science and mathematics, a broad knowledge of engineering techniques, and an understanding of the relation between technology and man. Curricula at Stanford are planned to offer the breadth of education and depth of training necessary for leadership in the profession. To engage in this profession with competence, four years of undergraduate study and at least one year of postgraduate study are recommended. For those who plan to work in highly technical development or fundamental research, additional graduate study is desirable.

A one-year program of graduate study in electrical engineering may lead to the degree of Master of Science. A two-year program, offering a wider selection of engineering course work, more opportunity for study in the related fields of physics, mathematics, and engineering, and in particular, more independent work and individual guidance, may lead to the degree of Engineer.

The degree of Doctor of Philosophy is offered under the general regulations of the University. The doctoral program, requiring a minimum of three years (nine quarters) of graduate study, should be considered by those with the ability and desire to make a life work of research or teaching.

APPLICATION FOR ADMISSION

Applications for admission with graduate standing in Electrical Engineering (EE) may be obtained by writing to Graduate Admissions, the Registrar’s Office, Old Union, Stanford, CA 94305 or by calling (650) 723-4291. Applications are submitted to and reviewed by the Department of Electrical Engineering. Applications for full time study are considered for the Autumn Quarter only. The application deadline is January 5. While it is strongly suggested that applicants meet this deadline, applications submitted after January 5 are reviewed on a space-availability basis.

Applicants who have not yet earned the equivalent of an M.S. degree should apply for admission to study first toward the master’s degree, indicating any intention of later working toward a more advanced degree. Admission for either the Engineer or Ph.D. degree is normally available only to students who have completed a master’s degree. In addition, candidacy to the Ph.D. or Engineer degree also requires that the department Committee on Graduate Admissions identify a tentative faculty research supervisor.

MASTER OF SCIENCE

University regulations governing the M.S. degree are described in the “Graduate Degrees” section of this bulletin.

Modern electrical engineering is a broad and diverse field, and graduate education in this department may satisfy a variety of objectives. Students with undergraduate degrees in physics, mathematics, or related sciences, as well as in various branches of engineering, are invited to apply for admission. They will ordinarily be able to complete the master's degree in one calendar year. Students with undergraduate degrees in other fields may also be admitted for graduate study (see below).

The master's degree program may provide advanced preparation for professional practice or for teaching on the junior college level, or it may serve as the first step in graduate work leading to the degree of Engineer or Ph.D. The faculty does not prescribe specific courses to be taken. Each student, with the help of a program adviser, prepares an individual program and submits it to the faculty for approval. The master's program proposal must be submitted to the department office during the first quarter of graduate study; modifications may be made later. Supplementary information sheets of detailed requirements, instructions, and a worksheet are available from the department office.

Programs of at least 45 quarter units that meet the following guidelines are normally approved:

1. A sequence of three or more graded electrical engineering courses numbered above 200, to provide depth in one area. The student must maintain an average 3.0 grade point average (GPA) or better in both the depth area and overall.

2. At least one EE course numbered above 200 in each of three additional course areas, outside of the area selected under item 1 to provide breadth.
3. Enough additional units of electrical engineering courses so that items 1 through 3 total at least 21 units of graded EE courses numbered above 200, including at least 9 units of such courses numbered in the 300s or 400s. Some 600 or 700 level summer courses may also be considered for inclusion in the M.S. program.

4. Additional coursework to bring the total to 45 or more quarter units, including:
   a) at least 36 graded units
   b) at least 36 units at or above the 100 level
   c) at least 30 units in technical areas such as science, mathematics, and engineering; thesis and Special Studies units cannot be included among these 30 units

5. At least three quarters of EE seminars, including 201 in Autumn Quarter. In case of time conflicts, tapes of these classes can be viewed in the Terman Library.

Capable students without formal undergraduate preparation in electrical engineering may also be admitted for graduate study. Such students may have graduated in any field and may hold either the B.S. or A.B. degree. Each student, with the help of an adviser, prepares a program of study to meet his or her particular needs and submits it to the faculty for approval. A student with adequate preparation in mathematics through calculus and college physics including electricity can usually complete the M.S. degree requirements within two academic years. A student with some additional preparation in electrical engineering may be able to complete the M.S. requirements in only one academic year.

Graduate study in electrical engineering demands that students be adequately prepared in circuits, digital systems, electronics, fields, lab work, mathematics, and physics. Skill in using modern computing facilities is essential for electrical engineers, and an increasing number of our courses routinely require it. Skill should be acquired early in the program, either by taking one of the regular computer science courses or one of the special “short courses” given by the Computation Center or by self-study.

It is the student’s responsibility, in consultation with an adviser, to determine whether the prerequisites for advanced courses have been met. Prerequisite courses ordinarily taken by undergraduates may be included as part of the graduate program of study. However, if the number of these is large, the proposed program should contain more than the typical 45 units, and the time required to meet the degree requirements may be increased.

Permission to study beyond the M.S. degree must be obtained from the department (if possible, well before the M.S. degree is received). The student needs to file a Graduate Program Authorization Petition. Permission is predicated on the applicant’s academic record, performance in independent work, potential for advanced study, and on the ability of the faculty to supervise such study.

**MASTER’S DEGREE PROGRAM IN ELECTRICAL ENGINEERING (EE) AND INDUSTRIAL ENGINEERING AND ENGINEERING MANAGEMENT (IEEM) THE DUAL DEGREE PROGRAM**

This dual-degree program enables a small, selective set of graduate students to obtain both the IEEM M.S. degree and the EE M.S. degree simultaneously. The total number of units required to complete the degree is 72 (versus 90 if the two degrees were pursued separately) and the total number of full-time quarters required to complete the dual degree is six (students with a 50 percent Teaching or Research Assistantship, who average nine units per quarter, earn .62 of a full quarter of residence).

The units and time to complete requirements are based on the student having the relevant background, such as students with work experience. Most students may need to take some of the background courses.

**Background Courses (10 units)**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comp. Sci. 106A. Programming Methodology</td>
<td>5</td>
</tr>
<tr>
<td>Stat. 190. Introduction to Statistical Methods</td>
<td>3-5</td>
</tr>
</tbody>
</table>

**Common Foundation Requirements (12 units)**

1. A course on statistical process control and design of experiments at the graduate level. Currently, this can be satisfied by Industrial Engineering (IE) 221, Quality Assurance and Control (3 units).
2. A course on basic manufacturing processes as specified by the EE adviser. Currently, this can be satisfied by EE 212 (3 units).
3. A course on performance measures.
4. EE 205, Entrepreneurial Engineer Seminar, or IE 292, Technology Management Seminar (1 unit).

**Electrical Engineering Core Requirements (21 units)**—At least 21 units that satisfy the M.S. in Electrical Engineering degree requirements as outlined below:

1. At least three graded EE courses numbered above 200 in one area to provide depth.
2. Three graded EE courses numbered above 200 in an area outside of requirement 1 to provide breadth.
3. Additional units in EE numbered above 200, of which at least nine are above 300, so that the total of requirements 1, 2, and 3 amounts to at least 21 units.

Part of the 21 units above can be satisfied with up to 3 units of seminars, for example EE 201.
Industrial Engineering and Engineering Management Core Requirements (21 to 23 units)—

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
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<tbody>
<tr>
<td>IE 133. Industrial Accounting</td>
<td>3-4</td>
</tr>
<tr>
<td>IE 203. Organizational Behavior</td>
<td>4</td>
</tr>
<tr>
<td>IE 261. Inventory Control and Production Systems</td>
<td>3</td>
</tr>
<tr>
<td>IE 269. Marketing in Technology-Based Firms</td>
<td>4</td>
</tr>
<tr>
<td>IE 270. Strategy in Technology-Based Firms</td>
<td>4</td>
</tr>
<tr>
<td>One additional 200-level course offered by IEEM</td>
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</tbody>
</table>

Electives (6 units or more)—Additional units in EE and IEEM and other departments to meet the total requirement of 72 units.

ADMISSION OF STUDENTS

For the dual degree, admission to both departments is required, but is coordinated by designated members of both admissions committees who make recommendations to the committees of their respective departments.

STUDENT ADVISING

Every student in the dual degree program has one adviser in EE, and one in IEEM. In addition, a committee consisting of designated faculty from both departments serves as a review committee on performance and as an overseeing body of ongoing and graduating students of the program. The committee, consisting of designated members of both admission committees as described in the previous section, may initially serve as this overseeing body.

ENGINEER

The degree of Engineer requires a minimum of two academic years (90 quarter units) of study beyond the B.S. degree (three academic quarters beyond the M.S.) including six full-time quarters of approved work as a graduate student (of which a minimum of three quarters and 36 quarter units must be in residence at Stanford).

Work toward the degree of Engineer in Electrical Engineering normally includes the requirements for work toward the master's degree in Electrical Engineering, including qualifications for admission.

An additional year allows time for a broader program, or a more concentrated program, or whatever arrangement may seem suitable to the candidate, his adviser, and the department. Advanced study at other universities, or in other departments at Stanford, may be allowed within the foregoing consideration. The equivalent of approximately one quarter is devoted to independent study and thesis work with faculty guidance. The thesis is often of the nature of a professional report on the solution of a design problem. The degree of Engineer differs from the Ph.D. in that it prepares for professional engineering work rather than theoretical research. The candidate may select courses that are suitable for either the degree of Engineer or the Ph.D. degree and decide later which program to pursue.

The best procedure for the applicant to follow is (1) if now working toward the Stanford M.S. degree in Electrical Engineering, request permission to continue graduate studies beyond the master's degree, using the Graduate Program Authorization Petition form obtained from the Department of Electrical Engineering office, or (2) if not planning to receive the Stanford M.S. degree in Electrical Engineering, apply for admission to the Department of Electrical Engineering as a candidate for the degree of Engineer.

During the first quarter of work beyond the M.S. degree, formal application for admission to candidacy for the degree of Engineer is made on a form that can be obtained from the department office. The program of study is prepared by the student with the help of the thesis adviser and submitted to the academic secretary for approval. The form should contain a list of all graduate courses completed at Stanford and elsewhere and all courses yet to be completed.

DOCTOR OF PHILOSOPHY

A complete statement regarding the Ph.D. degree is found in the "Graduate Degrees" section of this bulletin.

Admission to a graduate program does not imply that the student is a candidate for the Ph.D. degree. Advancement to candidacy requires superior academic achievement, satisfactory performance on a qualifying examination, and sponsorship by two faculty members. Enrollment in Electrical Engineering 391, Special Studies, is recommended as a means for getting acquainted with a faculty member who might be willing to serve as a supervisor.

Not later than the first Autumn Quarter after receiving the M.S. degree, the applicant should submit an application to take the department qualifying examination (given each Winter Quarter). Upon successful completion of the qualifying examination and after securing agreement by two faculty members to serve as dissertation advisers, the student should file an Application for Doctoral Candidacy. Only after receiving department approval to that application does the student become a candidate for the Ph.D. degree.

Requirements may be summarized as follows. The student must complete successfully (1) a minimum of three years of residence with graduate standing, two years of which must be in residence at Stanford; (2) one or more qualifying examinations given by the faculty of the Department of Electrical Engineering; (3) an approved program of courses in electrical engineering and allied subjects; (4) an approved topic of research and a written dissertation, based on research, which must be a contribution to knowledge; (5) an oral examination that is a defense of disserta-
tion research and is taken near the completion of the doctoral program.

About one-fourth of the program of graduate study should be in departments other than Electrical Engineering. Courses shall be selected to form an integrated program, to be approved by the department. A student wishing to fulfill the requirements for a formal minor may elect to do so.

Ph.D. MINOR

For a minor in Electrical Engineering (EE), the student must fulfill the M.S. depth requirement, complete a total of at least 20 units of course work at the 200-plus level in electrical engineering (of which 15 units must be graded) and be approved by the department's Ph.D. Degree Committee. A (GPA) of at least 3.35 on these courses is required.

FINANCIAL ASSISTANCE

The department annually awards a limited number of fellowships, teaching assistantships, and research assistantships to incoming graduate students. The fellowships are usually awarded only to first-year graduate students in the EE Master of Science program. Most awards to Engineer and Ph.D. candidates are research assistantships, which are awarded by individual faculty research supervisors working in conjunction with the department Committee on Graduate Admissions. Research assistants are often able to write their theses as an integral part of the assistantship. To be considered for department assistance, applicants are only required to submit the admission application materials. Admitted applicants are notified of their status regarding financial assistance in their acceptance letters.

THE HONORS COOPERATIVE PROGRAM

Many of the department's graduate students are supported by the Honors Cooperative Program, which makes it possible for academically qualified engineers and scientists in nearby companies to be part-time graduate students in Electrical Engineering while continuing nearly full-time professional employment. For more information regarding the Honors Cooperative Program, see the "School of Engineering" section of this bulletin.

AREAS OF RESEARCH

Candidates for advanced degrees participate in the research activities of the department as paid research assistants or as students of individual faculty members. At any one time, certain areas of research have more openings than others. A new applicant should express a second choice of research interest in the event that there are no vacancies in the primary area of interest. At present, faculty members and students are actively engaged in research in the areas listed below.

COMPUTER SYSTEMS

Asynchronous Circuits
Compilers
Computer-Aided Design
Computer Architecture
Computer Graphics
Computer Networks
Computer Organization
Computer Reliability
Concurrent Languages
Concurrent Processes and Processors
Database and Information Systems
Distributed Systems
Embedded System Design
Hardware/Software Co-Design
Hardware Verification
Human Computer Interaction
Multimedia Systems
Operating Systems
Performance Measurement and Modeling
Programming Languages
Program Verification
Software Engineering
VLSI Design

INFORMATION SYSTEMS

Adaptive Control and Signal Processing
Adaptive Neural Networks
Biomedical Signal Analysis
Computer-Aided Design and Analysis of Systems
Data Communications
Digital Signal Processing
Estimation Theory and Applications
Fourier and Statistical Optics
Information and Coding Theory
Medical Imaging and Image Processing
Multivariable Control
Optical Communications
Optimization-Based Design
Pattern Recognition and Complexity
Quantization and Data Compression
Real-Time Computer Applications
Signal Processing Algorithms and Architectures
Speech and Image Coding

INTEGRATED CIRCUITS

Analog Integrated Circuits
Bipolar, MOS, and other Device and Circuit Technologies
CAD of Processes, Devices, and Equipment
Custom Integrated Circuits for Computers and Telecommunications
Digital Integrated Circuits
Integrated Sensors and Actuators
Mixed Signal Integrated Circuits
Nanostructures
Optoelectronic Integrated Circuits
Process, Device, Circuit, and Equipment Modeling
Sensors and Control for VLSI Manufacturing
VLSI Device Structures and Physics
VLSI Fabrication Technology
VLSI Materials, Interconnections, and Contacts
VLSI Packaging and Testing

LASERS AND QUANTUM ELECTRONICS
Coherent UV and X-Ray Sources
Free-Electron Lasers
Laser Applications in Aeronautics, Biology, Chemistry, Communications, Electronics, and Physics
Laser Devices and Laser Physics
Nonlinear Optical Devices and Materials
Optoelectronic Devices
Photoacoustic Phenomena
Semiconductor Diode Lasers
Ultrafast Optics and Electronics

MICROWAVES, ACOUSTICS, AND OPTICS
Acoustic Microscopy
Acousto-Optic Devices
Fiber Optics
Holography
Microwave Integrated Circuits and Devices
Nondestructive Testing
Optical Interferometry
Scanning Optical Microscopes

SOLID STATE
Applied and Fundamental Superconductivity
Crystal Preparation: Epitaxy and Ion Implantation, and Molecular Beam Epitaxy
Defect Analysis in Semiconductors
Electron and Ion Beam Optics
Electron Spectroscopy
Experimental Determination of the Electronic Structure of Solids
High Resolution Lithography
Laser, Electron, and Ion Beam Processing and Analysis
Magnetic Information Storage
Magnetic Materials Fundamentals and Nanostructures
Nanostructure Fabrication and Applications
Molecular Beam Epitaxy
Novel Packaging Approaches for Electronic Systems
Optoelectronic Devices
Physics and Chemistry of Surfaces and Interfaces
Semiconductor and Solid State Physics
Solid State Devices: Physics and Fabrication
Ultrasmall Electron and Photodevices

SPACE PHYSICS AND RADIOSCIENCE
Detection of Electromagnetic Fields from Earthquakes
Electrodynamic Tether Experiment on the Space Shuttle
Electromagnetic Waves and Plasmas
Geomagnetically Trapped Radiation
Ionospheric and Magnetospheric Physics
Ionospheric Modification
Lightning Discharges
Lightning-Ionosphere Interactions
Planetary Exploration
Radio Wave Scattering
Remote Sensing of Atmospheres and Surfaces
Space Engineering (also see the “Space Science and Astrophysics” section of this bulletin)
Ultra-Low Frequency Fluctuations of the Earth’s Magnetic Field
Very Low Frequency Wave Propagation and Scattering

TELECOMMUNICATIONS AND SPACE INFORMATION SYSTEMS
Applied Optics and Optoelectronics
Cellular Radio Systems/Networks
Channel Assignment/Handoff
Coherent Optical Communications
Communication Channels
Digital Telephone Switching
Frequency Reuse in Large Wireless Systems
High Performance Digital Signal Processing
Mobility Issues in Large Networks
Multiple Access Techniques
Multipath Mitigation Techniques
Optical Fiber Communications
Optical Networks
Optoelectronic Components and Systems
Propagation in and around Buildings
Radar Signal Processing
Radiating Systems
Satellite Communication Stations
Search for Extraterrestrial Intelligence
Space Data Management
Telephone and Data Networks
Underwater Communications
Voice Signal Processing
Wavelength Division Multiplexing
Wireless Local Area Data Networks
Wireless Personal Communication Systems

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.
(AU) indicates that the course is subject to the University Activity Unit limitations (8 units maximum).

Electrical engineering courses are numbered according to the year in which the courses are normally taken.
20-99 first or second year
100-199 third or fourth year
200-299 mezzanine course for advanced undergraduates or graduates
300-399 first graduate year
400-499 second or third graduate year
600-799 special summer courses

The Department of Electrical Engineering (EE) offers courses in the following areas:
ELECTRICAL ENGINEERING

Computer Hardware
Computer Software Systems
Control and Systems Engineering
Communication Systems
Electronic Circuits
Electronic Devices, Sensors, and Technology
Fields, Waves, and Radioscience
Image Systems
Lasers, Optoelectronics, and Quantum Electronics
Network Systems
Signal Processing
Solid State Materials and Devices
VLSI Design

UNDERGRADUATE

60Q. Stanford Introductory Seminar: Viewing Hazards on Earth from Space—(Same as Geophysics 60.) Preference to sophomores. Natural hazards (earthquakes, volcanoes, floods, hurricanes, and fires) affect thousands of people everyday. Twenty years of developments in spaceborne imaging technology help monitor and respond to such disasters more rapidly than in the past, saving lives and money. Understanding the physical processes involved allows us to anticipate and plan for mitigation of the consequences of the disasters. How these new tools are applied to natural disasters, and how the remotely-sensed data are manipulated and analyzed.

3 units, Win (Zebker)


3 units, Win (da Rosa)

100. The Electrical Engineering Profession—Lectures/discussions on topics of importance to the electrical engineering professional. Continuing education, professional societies, intellectual property and patents, ethics, entrepreneurial engineering, and engineering management. (Extensive reports for 2 units.) (AU)

1-2 units, Aut (Gray)


4 units, Win (El Gamal)


4 units, Spr (Boyd)


3 units, Aut (Cioffi)

105. Feedback Control Design—(Enroll in Engineering 105.)

106. Planetary Exploration—The other worlds of our solar system as revealed by recent space missions. Comparative properties of the terrestrial and Jovian planets; planetary atmospheres, surfaces, interiors, and rings; planetary and satellite orbits and spacecraft trajectories, orbital perturbations; properties of the interplanetary gas, dust, comets, and meteorites. What the planets can tell us about potential terrestrial catastrophes (acid rain, ozone depletion, nuclear winter, runaway greenhouse, collision with an asteroid or large comet). Origin and evolution of planetary systems. Remote sensing from spacecraft at radio, infrared, light, and ultraviolet wavelengths. U.S. and Russian space programs and their comparative engineering and scientific aspects. Prerequisite: one year of college engineering, mathematics, or physics.

3 units, Spr (Fraser-Smith)

111. Electronics I—Fundamental physics of semiconductor devices and their circuit applications. The physical principles of crystal structure, energy bands, charge densities, and charge motion in doped semiconductors, especially silicon; operating principles and device equations for PN diodes, and junction field-effect transistors; biasing, small-signal models, and elementary circuit applications of diodes. Prerequisite: Engineering 40. Corequisite: 101.

4 units, Aut (Wong)

112. Electronics II—Basic operating principles and device equations for MOS capacitors and transistors, and bipolar junction transistors. Basics of transistor amplifier and logic circuit design using MOS and bipolar transistors. Weekly one hour recitation session. Prerequisites: 101, 111.

4 units, Win (Wong)
113. Electronic Circuits—Bipolar amplifier design including DC bias, small signal performance, multistage amplifiers, frequency response, feedback. Design and use of bipolar operational amplifiers. Prerequisites: 102, 112.

3 units, Aut, Spr (Kovacs)

121. Digital Design Laboratory—Introduction to digital circuits and logic design. Topics: Boolean algebra, logic circuit electrical characteristics, combinational and sequential logic building blocks, state machines, programmable logic devices, hierarchical logic design, computer-aided design and logic simulation. Lab. Prerequisite: Engineering 40.

(WIM)

3 units, Win (Gill) Spr (Wakerly)

122. Analog Laboratory—Design and testing of analog circuits. Transistor amplifier with feedback; discrete components differential amplifier; op-amps and their applications; active filters and oscillators; regulated power supplies; power amplifiers. Lab. Prerequisite: 113.

3 units, Aut, Spr (Dutton)

133. Analog Communications Design Laboratory—Design and testing of analog communications circuits including applications. Amplitude modulation (AM) using discrete multiplier circuits and fully integrated implementations. Phase and Frequency Modulation (FM) based on discrete and integrated modulator circuits such as voltage-controlled oscillators (VCOs). Phased-Lock Loop (PLL) techniques, characterization of key parameters and their applications, e.g., in modems. Lectures on practical aspects of circuit implementations. Labs involve the systematic building and characterization of AM, FM, and PLL circuits and subsystems. Enrollment limited to 40 undergraduate and cterminal EE students. Prerequisite: 113.

3 units, Win (Dutton)

137. Laboratory Electronics—(Enroll in Applied Physics 207.)

138. Laboratory Electronics—(Enroll in Applied Physics 208.)

140. The Earth from Space: Introduction to Remote Sensing—(Enroll in Geophysics 40.)


4 units, Aut (Inan)


3 units, Win (Inan)

144. Wireless Electromagnetic Design Laboratory—Required for undergraduate Fields and Waves specialty area. Lecture, lab, and design project. Hands-on experiments and projects with antennas, transmission lines and propagation for wireless communications and remote sensing. Uses simple, inexpensive lab equipment as a front end to the personal computer. Measurement and design capability in 1-20 GHz range in support of design project. Two- to three-person team projects from antenna, guided wave distributed circuits, remote sensing, or related topics. Working model constructed and demonstrated; some funding available for project costs. Prizes for best projects. Lab. Enrollment limited to 30. Prerequisites: 122, 142 or consent of instructor

3 units, Spr (Leeson)


181. Introduction to Computer Systems and Assembly Language Programming—(Enroll in Computer Science 110.)


4 units, Aut (Alpert) Win (Hennessy, Heinrich)

183. Advanced Logic Design Laboratory—Experiments in digital logic design using TTL integrated circuits, MSI and LSI registers and ALUs, Programmable Gate Arrays, and PLAs. Choice of projects: various sequential machines, D/A converters and CRT displays, integrators, arithmetic processors, stored-program processors, game-playing machines. Lab. Enrollment limited to 25; preference to graduating seniors in Spring Quarter. Co- or prerequisite: 121.

3 units, Win (Olukotun) Spr (Kim)

184. Programming Paradigms—(Enroll in Computer Science 107.)
188. Introduction to Verification and Concurrency—(Enroll in Computer Science 156.)

189A. Object-Oriented Systems Design—(Enroll in Computer Science 108.)

189B. Software Project—(Enroll in Computer Science 194.)

190. Special Studies or Projects in Electrical Engineering—Independent work under the direction of a faculty member. Individual or team activities involving lab experimentation, design of devices or systems, or directed reading. 

by arrangement

191. Special Studies and Reports in Electrical Engineering—Independent work under the direction of a faculty member given for a letter grade only. If a letter grade given on the basis of required written report or examination is not appropriate, student should enroll in 190. 

by arrangement

192. Special Seminars—Special seminars and experimental courses are given on topics of current interest by specialists in the field. Announcements are made one or two quarters prior to presentation. See Time Schedule and bulletins in the department office for current listing. 

by arrangement

UNDERGRADUATE AND GRADUATE

201A. Seminar—Weekly discussions of special topics of current interest in electrical engineering. Orientation to Stanford and to the EE department. Students with a conflict may view via videotape in the library. (AU)

1 unit, Aut (Reis)

201B. Seminar—Looks at “Life after Stanford” through a series of presentations primarily directed at MS/EE students. The activities of graduates in industry (large, medium, and small), start-up companies, government laboratories, and community colleges. (AU)

1 unit, Win (Reis)

202. Medical Electronics—Primarily biological in nature. Introduces electrical engineers to the physiological and anatomic aspects of medical monitoring and imaging. Biological content, transducers, electronic systems, the socio-economic impact, and the constraints unique to medicine. Recommended: some familiarity with circuits and electrical instrumentation techniques (e.g., 113).

3 units, Aut (Thompson)

203. The Entrepreneurial Engineer—Seminar furthers the knowledge base of prospective entrepreneurs with an engineering background. Contributions made to the business world by engineering graduates. Speakers include Stanford (and other) engineering and M.B.A. graduates who have found-ed large and small companies in nearby communities. Contributions from EE faculty members and other departments (law, business, and industrial engineering). (AU)

1 unit, Win (Melen)

205. Introduction to Control Design Techniques—(Enroll in Engineering 205.)

206. Control System Design and Simulation—(Enroll in Engineering 206.)

209. Optimal and Nonlinear Control—(Enroll in Engineering 209.)

212. Integrated Circuit Fabrication Processes—For students interested in IC design and the influence of fabrication processes or intending to pursue doctoral research involving use of Stanford’s IC laboratory. The process simulator SUPREM is used to gain hands-on “virtual” lab experience. Topics: fundamental principles of integrated circuit fabrication processes, physical and chemical models for crystal growth, oxidation, ion implantation, etching, deposition, lithography and metallization; the interactions of IC layout and processing for bipolar and MOS devices. Required for 410. Prerequisite: 112 or equivalent.

3 units, Aut (Plummer)

213. Heat Transfer in Microdevices—(Enroll in Mechanical Engineering 258.)


3 units, Aut (Lee)

216. Principles and Models of Semiconductor Devices—Fundamentals of carrier generation, transport, recombination, and storage in semiconductors. Physical principles of operation of the p-n junction, metal semiconductor contact, bipolar junction transistor, MOS capacitor, MOS and junction field-effect transistors, and related devices such as CCDs and solar cells. First-order device models that reflect physical principles and are useful for integrated-circuit analysis and design. Prerequisites: 111, 112, or equivalent.

3 units, Aut (Saraswat)

217. Electron and Ion Beams for Semiconductor Processing—Focused and flood beams of electrons and ions are employed for processing semiconductor devices. Part I: the generation of such beams including thermionic emission, field-induced emission, first-order focusing and glow discharge processes. Part II: the interactions of such beams with the target including scattering in solids, the distribu-
tion of energy, heating, sputtering, beam-induced etching (including reactive-ion etching) and beam-induced deposition. Introduction to computer modeling of etching and deposition. Prerequisite: 212 or equivalent.

3 units (McCord)
alternate years, given 1998-99

222 Applied Quantum Mechanics I—(Enroll in Applied Physics 222.)

223 Applied Quantum Mechanics II—(Enroll in Applied Physics 223.)

228. Basic Physics for Solid State Electronics—Advanced undergraduate/graduate, introducing the physics underlying modern solid state materials and devices. Topics: the energy band theory of solids, energy bandgap engineering, classical kinetic theory, statistical mechanics, equilibrium and non-equilibrium semiconductor statistics. Prerequisite: 112.

3 units, Aut (J. Harris)

229B. Thin Film and Interface Microanalysis—(Enroll in Materials Science and Engineering 323.)

229D. Introduction to Magnetism and Magnetic Materials—(Enroll in Materials Science and Engineering 347.)

231. Lasers I—Introduction to lasers and how they work, including quantum transitions in atoms, stimulated emission and amplification, rate equations, saturation, feedback, coherent optical oscillation, laser resonators, and optical beams. Limited primarily to steady-state behavior; uses classical models for atomic transitions with little quantum mechanics background required. Prerequisites: electromagnetic theory to a level of at least 142, preferably 241, and some knowledge of atomic or modern physics such as Physics 57, 130-131.

3 units, Aut (Siegman)

232. Lasers II—Continuation of 231, emphasizing dynamic and transient effects including spiking, Q-switching, mode locking, frequency modulation, frequency and spatial mode competition, linear and nonlinear pulse propagation, short pulse expansion and compression. Prerequisite: 231.

3 units, Spr (Siegman)

238. Electrical and Magnetic Properties of Solids—(Enroll in Materials Science and Engineering 209.)

239A. Solid State Physics: Survey—(Enroll in Applied Physics 372.)

239B. Solid State Physics: Continuation—(Enroll in Applied Physics 373.)

239C. Photoelectronic and Photovoltaic Materials and Devices—(Enroll in Materials Science and Engineering 332.)

241. Waves I—Introduction to waves and wave phenomena as they appear in different natural, lab, and application settings. Electromagnetic, acoustic, seismic, atmospheric, plasma, and water waves and their mathematical and physical correspondence in terms of Hamilton’s principle. Propagation, attenuation, reflection, refraction, surface and laminar guiding, and intrinsic and structural dispersion; energy density, power flow, and phase and group velocities. Geometric and structural complexities are minimized to stress basic wave concepts common to diverse fields of application. Analysis in terms of transmission line and impedance concepts using exponential notation and vector phasors. Treatment limited to plane harmonic waves in isotropic media. Nonhomogeneous cases limited to plane interfaces and exponentially stratified media. Prerequisite: 142 or equivalent or other wave course.

3 units, Aut (Tyler)

242. Waves II—Continuation of 241, emphasizing fundamental topics in EM theory for further study and application of microwave, optical, or plasma phenomena. Plane, cylindrical, and spherical waves and boundary value problems; radiation and reciprocity; wave guides, fiber optics, and cavity resonators. Uniaxial and gyrotropic anisotropic media with magnetodielectric plasma, and ferrite applications. Resonators. Perturbation theories, attenuation, and energy conservation. Prerequisite: 241 or 142.

3 units, Win (Hesselink)

243. Semiconductor Optoelectronic Devices—Introduction to semiconductor optoelectronic devices for communications and other applications, covering operating principles and practical device features. Review of relevant semiconductor physics, and optical processes in semiconductors. Semiconductor heterostructures. Basic optical waveguide theory. Semiconductor optical detectors (including p-i-n, avalanche, and MSM), light emitting diodes, electroabsorptive modulators (Franz-Keldysh, QCSE), electrorefractive (directional couplers, Mach-Zehnder), switches (SEEDs), and lasers (waveguide and vertical cavity). Prerequisites: basic quantum mechanics, solid state physics, lasers (e.g., 222, 228, 231, or equivalents).

3 units, Win (Miller)

244. Communication Engineering Transmission Systems—Design of transmission systems for television, telephone, and data-using satellites, microwave repeaters, mobile radio, and broadcast transmitters. Performance of FM, AM, SSB common digital schemes and spread-spectrum modulation, time, frequency, and code multiplexing. Emphasis on link performance, capacity, total system design, and cost optimization. Current industry design problems and research results. Prerequisite: senior or graduate standing in Electrical Engineering, or consent of instructor.

3 units, Aut (Lusignan)

245. Wireless Electromagnetic Design Laboratory—See 144.

3 units, Spr (Leeson)
246. Microwave Engineering—Coherent development of the concepts and applications of distributed circuits. Emphasis on MIC structures (microstrip, coplanar waveguide, slotline, finline, and image-line) capable of transmitting millimeter wave analogue signals and picosecond pulses. Modal properties (TEM, quasi-TEM, TE, TM) of general guidelines. Higher order mode excitation effects at discontinuities (steps, bends, etc.) and junctions are modeled by lumped equivalent circuits, using Z-, Y- and S-matrix representations. Dispersion, attenuation, and distributed source excitation in distributed circuits. Analysis of circuit components (impedance transformers, directional couplers, hybrids, circulators, filters, solid state amplifiers). Illustrations of IC circuit structures. Computer-aided design principles. Recommended: 142 or equivalent. 3 units, Spr (Tyler) alternate years, not given 1998-99


248. Fundamentals of Noise Processes—Introduction to statistical processes and Fourier analysis: binomial, Gaussian and Poisson distributions; time averaging vs. ensemble averaging; Parseval and Wiener-Khintchine theorems. Thermal noise and quantum noise: fluctuation-dissipation theorem, Johnson-Nyquist formula, zero-point fluctuation. Noise of junction devices, amplifiers and oscillators: van der Pol oscillator and parametric oscillator. Noise consideration of communication and weak force detection systems. Prerequisites: familiarity with elementary device physics and electromagnetism to the level of 111, 112, and 141. 3 units, Au (Yamamoto)

249. Introduction to the Space Environment—Experimentation in the near-earth space environment, using radio and other electromagnetic waves and electric and magnetic instrumentation on space probes. Tools used: transmitters, antennas, receivers, sensors, radars, and displays. The earth’s ionosphere, magnetosphere, and interplanetary space. The role of the sun, and the effects produced by changes in solar activity. Geoelectric and geomagnetic fields. Charged particle motion, trapped particles (Van Allen radiation), and the aurora. Applications to current experimental programs. Planning and execution of experiments. Prerequisites: familiarity with electromagnetics at the level of 142 and senior or graduate standing. 3 units, Au (Fraser-Smith) alternate years, not given 1998-99

250. Communications Seminar—Offered on-line and aimed at those seeking a high-level overview of telecommunications activities in industry and at Stanford. Topics in the areas of high-speed networks, optical communications, mobile networks, wireless systems, distributed systems, network control and telecommunications applications, products, and services. (AU) 1 unit, Au, Spr (D. Harris)


254. Principles of Radar Systems—Analysis and design, emphasizing radars as systems. Radar equation and systems parameters, components of radar systems, radar cross-section and target characteristics, signal detection in noise, ambiguity function (with applications to measurement precision, resolution, clutter rejection, and waveform design); pulse compression waveforms, synthetic aperture radar, tracking and scanning radars, HF (OTH) radar, radar remote sensing, radar astronomy. Prerequisite: senior undergraduate or graduate standing. 3 units, Win (Tyler, Zebker) alternate years, not given 1998-99

261. The Fourier Transform and its Applications—The Fourier transform as a tool for solving physical problems. Fourier transform of discrete and continuous time signals, generalized transforms, and Fourier series. Convolutions and correlations, the Dirac delta function, Fourier transform theorems, measures of time duration and bandwidth, analysis of linear systems, sampling theorems, the discrete Fourier transform, and two-dimensional
Fourier analysis. Prerequisite: previous exposure to Fourier series at the level of 102.
3 units, Aut (Nishimura) Win (Gray) Spr (Kazovsky)

262. Two-Dimensional Imaging—Time and frequency representations, two-dimensional auto- and cross-correlation, Fourier spectra, diffraction and antennas, coordinate systems and the Hankel and Abel transforms, line integrals, impulses and sampling, restoration in the presence of noise, reconstruction and tomography, imaging radar. Prerequisites: 261. Recommended: 278, 279.
3 units, Aut (Zebker)

3 units, Aut (Widrow) Spr (Meng)

265. Applications of the Fast Fourier Transform (FFT) in Digital Audio Signal Processing—(Enroll in Music 420.)
266. Signal Processing Methods in Musical Acoustics—(Enroll in Music 421.)
268. Introduction to Modern Optics—Geometrical optics: raytracing, Gaussian beams, optical instruments, and radiometry. Wave nature of light: Maxwell’s equations, propagation through media with varying index of refraction (e.g., fibers). Interferometry: basic principles, practical systems, and applications.
3 units, alternate years, given 1998-99

271. Introduction to VLSI Systems—Large-scale MOS Design. Topics: MOS transistors, static and dynamic MOS gates, MOS circuit fabrication, design rules, resistance and capacitance extraction, power and delay estimation, scaling, MOS combinational and sequential logic design, registers and clocking schemes, memory, data-path, and control-unit design. Elements of computer-aided circuit analysis, synthesis, and layout techniques. Prerequisites: 112; familiarity with circuits, logic design, and digital system organization.
3 units, Aut (Horowitz) Spr (Dally)

272A. Design Projects in VLSI Systems—For students with research and applications interest in VLSI systems. Teams of two complete modest-sized CMOS chip of their own design, including writing a functional model (in Verilog), using synthesis tools, custom layout, and simulation. Overview of the issues involved in VLSI design. Topics: design tools and techniques, complexity management, clocking issues, layout and floorplanning, design of large array structures, testing and testability issues. Lab. Prerequisites: 271, experience with digital design.
4 units, Win (Horowitz)

272B. Testing and Simulation of VLSI Systems—Continuation of 272A, simulating, testing, and elaborating projects designed in 272A. Students functionally simulate and test projects and report the results. Additional credit for more extensive work by arrangement. Lectures include simulation and testing techniques used in the lab. Lab. Prerequisite: completing the 272A design project.
2 units, Spr (Horowitz)

275. Logic Design—(Formerly 381.) Principles and techniques of logic design. Combinational circuit analysis (hazard detection); combinational circuit design including PLA, VLSI, and MSI techniques and testing techniques; IC logic families, flipflop properties, sequential circuit analysis and synthesis for fundamental and pulse mode circuits, design for testability techniques. Prerequisite: 121 or equivalent.
3 units, Aut, Win (McCluskey)

3 units, Spr (Cox)

278. Introduction to Statistical Signal Processing—Random variables, vectors, and processes; time averages, expectations, and laws of large numbers; stationarity, autocorrelation and spectral analysis; linear filtering of random processes; independent increment, Gaussian, and Poisson random processes. Prerequisites: 102 or 261, Statistics 116.
3 units, Aut (El Gamal) Spr (Gray)

279. Introduction to Communication Systems—Analysis and design of communication systems: analog and digital modulation and demodulation, frequency conversion, multiplexing, noise and distortion; spectral and signal-to-noise ratio analysis,
error ratios in digital systems. Prerequisites: 102 or 261, 278.

3 units, Win (Cox)

281. Embedded System Design Laboratory—Lectures on the architecture and design of microprocessor-based systems. Lab experiments use Motorola 68HC11 microcontroller evaluation board. Five-week individual design project. Lab. Prerequisites: 121, and 181 or 182 or equivalent experience in assembly language programming.

3 units, Aut (Gill)

282. Computer Architecture and Organization—Structure of systems using processors, memories, input/output (I/O) devices, and I/O interfaces as building blocks. Computer system instruction set design and implementation, including memory hierarchies and pipelining. Issues and tradeoffs involved in the design of computer system architectures with respect to the design of instruction sets. Prerequisite: 182.

3 units, Win (Dally)

282H. Computer Architecture and Organization (Honors)—Accelerated version of 282. Students are expected to have complete familiarity with the basics of computer implementation and control, including finite state machine control and microprogrammed control, and be familiar with logic design and the basics of CPU performance metrics (CPI) and memory system design. Diagnostic qualifying quiz is given on the first day.

3 units, Aut (Olukotun)

283. Compilers—(Enroll in Computer Science 143.)

284. Introduction to Computer Networks—Structure and components of computer networks; functions and services; packet switching; layered architectures; ISO's Open Systems Interconnections (OSI) reference model; physical layer; data link layer; error checking; window flow control; media access control protocols used in local area networks (Ethernet, Token Ring, FDDI) and satellite networks; network layer (datagram service, virtual circuit service, routing, congestion control, IP); transport layer (UDP, TCP); session layer; applications. Prerequisite: 284 or Computer Science 244A.

3 units, Aut (Tobagi)

285. Programming Languages—(Enroll in Computer Science 242.)

286A. Operating Systems and Systems Programming—(Enroll in Computer Science 240A.)

286B. Advanced Topics in Operating Systems—(Enroll in Computer Science 240B.)

287. Introduction to Computer Graphics—(Enroll in Computer Science 248.)


289. Introduction to Computer Vision—(Enroll in Computer Science 223B.)

290A,B,C. Practical Training for Electrical Engineers—For EE majors who need relevant work experience as part of their program of study. Final report required. Prerequisite for 290B,C: EE Ph.D. candidate.

1 unit, Aut, Win, Spr (Gray)

292. Special Seminars—Special seminars and experimental courses are given on topics of current interest by specialists in the field. Announcements are made one or two quarters prior to presentation. See Time Schedule and bulletins in the department office for current listing.

by arrangement


3 units, Aut (da Rosa)


3 units, Win (da Rosa)

GRADUATE

300. Master's Thesis and Thesis Research—For students who wish to do independent work under the direction of an EE faculty member as part of their master's degree program. Written thesis is required for final letter grade. The continuing grade 'N' is given in quarters prior to the thesis submission. (See 390 if a letter grade is not appropriate.)

by arrangement

310. Integrated Circuits Technology and Design Seminar—In-depth treatment of device structures, fabrication technologies, and circuit design issues in integrated circuits. Introduces current research topics in these areas. (AU)

1 unit, Aut (Wong)

Win (Kovacs)

Spr (Lee)

311. Advanced Integrated Circuit Fabrication Processes—What are the practical and fundamental limits to the evolution of the technology of modern MOS and bipolar devices? How are modern devices and circuits fabricated and what future changes are likely? Advanced techniques and models of device and back-end (interconnect and con-
312. Solid-State Sensors and Actuators—Surveys solid-state sensors and actuators focusing on fabrication techniques. Physical models for submicron structures, control of electrical characteristics (threshold voltage, breakdown voltage, current gain) in small structures, and alternative device structures for VLSI. Prerequisites: 212, 216, or equivalent.

3 units, Win (Wong)

317. Microlithography—Fundamentals of exposure and development of resist patterns down to submicron dimensions. The interaction of the exposing radiation with resists and the generation of high quality images using light, x-rays, electrons, and ions. Some "hands-on" computer simulation of the exposure and development of patterns in resist. Prerequisites: 212, basic competence in computing 141 or equivalent.

3 units, Spr (Saraswat)

318. Logic Synthesis of VLSI Circuits—Solving logic design problems with CAD tools for VLSI circuits. Analysis and design of exact and heuristic algorithms for logic synthesis. Topics: representation and optimization of combinational logic functions (encoding problems, binary decision diagrams), representation and optimization of multiple-level networks (algebraic and Boolean methods, "don’t care" set computation, timing verification, and optimization), modeling and optimization of sequential functions and networks (retiming), semicustom libraries and library binding. Prerequisites: familiarity with logic design, algorithm development, and programming.

3 units, Win (DeMicheli)

319. Computer-Aided System Design Laboratory—Computer-aided design of VLSI systems: theory and practice. System-level design algorithms and tools. Individual/group projects using CAD tools. Lecture topics: modeling languages (e.g., Verilog, VHDL), architectural synthesis and optimization methods (scheduling, binding, data-path, and control synthesis), and hardware/software co-design. Prerequisite: 318.

3 units, Spr (DeMicheli)

325. Principles of Magnetic Recording—Enroll in Materials Science and Engineering 348.)

327. Properties of Semiconductor Materials—Modern semiconductor devices and integrated circuits are based on the unique energy band, carrier transport, and optical properties of semiconductor materials. How these physical properties can be chosen and optimized for operation of semiconductor devices. Emphasis is on the quantum mechanical foundations of the properties of solids, energy bandgap engineering, semi-classical transport theory, semiconductor statistics, carrier scattering, electrolyte/magneto transport effects, high field ballistic transport, Boltzmann transport equation, quantum mechanical transitions, optical absorption, and radia-
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ELECTRICAL ENGINEERING

328. Physics of Advanced Semiconductor Devices—The principles governing the operation of modern semiconductor devices. Underlying assumptions and approximations commonly made in analyzing devices. Emphasis is on the application of semiconductor physics to development of advanced semiconductor devices (e.g., heterojunctions, HJ-bipolar transistors, HJ-FETs, nano structures, tunneling, single electron transistor and photonic devices). Use of ATLAS and MEDICI 2-D Poisson solvers for simulation of ultra-small devices. Examples are related to up-to-date device research.

3 units, Spr (J. Harris)

329. The Electronic Structure of Surfaces and Interfaces—Basic physical concepts and phenomena for surface science techniques probing the electronic structure of surfaces and interfaces. Microscopic and atomic models in understanding microstructures have technologically important applications, e.g., within semiconductor device technology and catalysis. The basic physical processes of low energy electron diffraction, Auger electron spectroscopy, UV and x-ray photoemission spectroscopy, electron/photon stimulated ion desorption, inelastic tunneling spectroscopy, ion scattering, surface EXAFS, and energy loss spectroscopy; and experimental aspects of these surface science techniques. Prerequisites: Physics 70 or equivalent; 238 or consent of instructor.

3 units, alternate years, given 1998-99

331. The Science of Semiconductor Interfaces—The physics and chemistry of interfaces in semiconductor device structures at an atomic level. Metal-Insulator-Semiconductor (MOS and MIS) Systems; atomic level mechanisms for traps and fixed charge; accurate derivation of band bending for accumulation, depletion, and inversion; effect of impurities and defects. Metal-Semiconductor (MES) Systems; importance of metal-semiconductor chemical reactions; mechanisms of Schottky barrier formation; mechanisms for ohmic contact formation, including tunneling, MIS diodes, and heterostructures. Interface effects in heterostructures; interdiffusion and defects. Prerequisites: any two of 216, 228, 238, 222 327.

3 units, alternate years, given 1998-99


3 units, Win (Wang)

338A. Quantum Optics and Measurements—(Enroll in Applied Physics 387.)

338B. Mesoscopic Physics and Nanostructures—(Enroll in Applied Physics 388.)

344A,B. High Frequency Laboratory—Combination lecture/lab emphasizing the lab. Techniques in the 1MHz-1GHz range useful in designing and measuring oscillators, amplifiers, and mixers. Basic high frequency measurement techniques including s-parameter measurements. Lectures by the professor and experts from Hewlett-Packard. (Two lectures, one lab weekly.)

3 units, Spr (Miller)

344A. Enrollment limited to 25. Prerequisites: good understanding of transmission lines, Smith charts.

3 units, Aut (Cox)

344B. Smith charts. More in-depth than 344A. Students receive credit for only one of 344 A or B. Students intending advanced study in this field take 344B. Prerequisites: 314, good understanding of transmission lines, Smith charts.

3 units, Spr (Lee)

346. Introduction to Nonlinear Optics—Wave propagation in anisotropic, non-linear, and time-varying media. Microscopic and macroscopic description of electric dipole susceptibilities. Free and forced waves—phasematching; slowly varying envelope approximation—dispersion, diffraction, space-time analogy; harmonic generation; frequency conversion; parametric amplification and oscillation; and electro-optic light modulation. Prerequisites: 241, 242.

3 units, Spr (S. Harris)

347. Optical Methods in Engineering Science—The design and understanding of modern optical systems. Topics: geometrical optics, aberration theory, systems layout, applications such as microscopes, telescopes, optical processors. Computer ray tracing program used for class demonstrations and as a design tool. Prerequisite: 268 or 366 or equivalent.

3 units, Spr (Hesselink)

alternate years, not given 1998-99

348. Advanced Optical Fiber Communications—Components: couplers, laser linewidth and phase
noises, acousto-optical filters, fiber gratings, fiber Fabry-Perot filters, surface-normal Fabry-Perot filters, isolators. Systems: coherent systems (homodyning and heterodyning, balanced receivers, phaselocked and non-synchronous demodulation, line-width requirements, polarization fluctuations and techniques to handle them, multichannel systems); optical amplifiers (semiconductor optical amplifiers—impact of facet reflectivity, antireflection coating, angled and buried facets, polarization sensitivity and intermodulation, gain saturation, rate equation model, noise characteristics, optical fiber amplifiers, erbium-doped fibers, pumping at 532, 807, 980 and 1547 nm, gain and gain saturation, noise and noise figure; applications—in-line power amplifiers and receiver preamplifiers); solitons (all-optical vs. electric regenerators, the nonlinear Schrodinger equation, solitons and lumped amplifiers, amplifier spacing and amplified spontaneous emission, ASE-induced timing jitter, error rates in solution transmission, WDM with solutions, sources of solution pulses). Networks: SONET ATM, WDM; signaling and synchronization; routing, scalability, and wavelength conversion; analog systems (dynamic range and noise figure, CATV, and cellular applications). Prerequisite: 247.  
3 units, Win (Kazovsky)  

349. Advanced Modern Optics—Holography (basic principles, Bragg holography); photorefractive effect (physical principles and applications); wave matter interactions (polarization effects); advanced signal processing (real-time processors, optical interconnects, holographic and associative memories). Prerequisite: 268 or 366, or equivalent.  
3 units, alternate years, given 1998-99  

350. Radioscience Seminar—Seminars by university and industrial researchers on topics from space physics, planetary exploration, ionospheric and magnetospheric physics, radar and remote sensing of the environment, applied electromagnetics, waves in optical fibers and information systems with space applications. Student-faculty discussions. (AU)  
1 unit, Aut (Zebker)  
Win (Inan)  
Spr (Fraser-Smith)  

351. Digital Switching in Telecommunications—Switching fundamentals, space and time switching, blocking probability analysis, rearrangeable networks, self-routing networks, fast packet switching architectures, network synchronization, signaling methods, analog and digital terminations. Prerequisite: 244 or 374, or equivalent.  
3 units, Spr (Narasimha)  

352. Electromagnetic Waves in the Ionosphere and Magnetosphere—Magnetoionic theory in multi-component media, signal dispersion, group ray velocity, wave polarization, refractive index surfaces, ray tracing, absorption, boundary effects, interpretation of natural phenomena (whistlers, VLF emissions), remote sensing in plasmas, communication, theory of wave-particle interactions in the magnetosphere. Prerequisite: 142 or equivalent.  
3 units, alternate years, given 1998-99  

353. Business Management for Electrical Engineers—Focuses on issues involved in business decision making; case method examines real situations and companies. Problems of the software industry isolated and examined. Strategic planning. Issues in management of new product development, marketing, and manufacturing. Basics of accounting and financial analysis. Typical issues, the functional areas of an enterprise, fundamental management principles, and an ability to pursue areas of interest independently. Enrollment limited to 60. No auditors. Prerequisite: graduate student in Electrical Engineering or Computer Science.  
3-4 units, Aut (enroll in Computer Science 394)  
Spr (Gibbons)  

354. Introduction to Radio Wave Scattering—Integral and differential equations of radio wave scattering: exact, approximate, and numerical solutions of single particle scattering for spheres, edges, points, and cylinders. Scattering from rough surfaces with large and small roughness scales, as time permits. Multiple scattering; formulation and solution techniques for equation of transfer in discrete media and scattering by continuous media in weak and strong regimes. Applications to radar, radar astronomy, remote sensing, and biological media. Prerequisites: 241 or equivalent, and partial differential equations, or consent of instructor.  
3 units, alternate years, given 1998-99  

355. Imaging Radar and Applications—Radar remote sensing, radar image characteristics, viewing geometry, range coding, synthetic aperture processing, correlation, range migration, range/Doppler algorithms, wave domain algorithms, polar algorithm, polarimetric processing, interferometric measurements. Applications: polarimetry and target discrimination, topographic mapping surface displacements, velocities of ice fields. Prerequisites: 254, 261. Recommended: 264, 278, 279.  
3 units, alternate years, given 1998-99  

3 units, Spr (Narasimha)  
alternate years, not given 1998-99  

357. Microstructures Fabrication Laboratory—Enrollment preference to students pursuing doctor-
365. Vision and Image Processing Laboratory—(Enroll in Applied Physics 304.)

358B. Nonlinear Optics Laboratory—(Enroll in Applied Physics 305.)

361A. Modern Control Design I—(Enroll in Engineering 207A.)

361B. Modern Control Design II—(Enroll in Engineering 207B.)

362. Applied Vision and Image Systems—(Enroll in Psychology 221.)


3 units, alternate years. given 1998-99


3 units, alternate years, given 1998-99


3 units, Aut (Hesselink) alternate years, not given 1998-99

367. Statistical Optics—Applications of statistical tools to a variety of problems in modern optics. First-order statistical properties of thermal and laser light, effects of partial polarization, basic definitions of coherence, propagation of mutual coherence functions, the Van Cittert-Zernike theorem, imaging with partially coherent light, imaging through randomly inhomogeneous media, and statistics of optical detection processes. Prerequisites: 278, 366.

3 units, alternate years. given 1998-99

368. Digital Image Processing—Topics: physical descriptions of continuous images; properties of the human visual system; sampling and quantization of image; matrix representation of image forming and image processing systems; unitary transforms; image compression enhancement, scene matching and recognition, and applications. Demonstrations. Students write image processing algorithms. Enrollment limited to 35. Prerequisite: 261.

3 units, Spr (Goodman) alternate years, not given 1998-99

369A. Medical Imaging Systems I—Imaging internal structures within the body using high-energy radiation studied from a systems viewpoint. Modalities covered: x-ray, computerized tomography, and nuclear medicine. Analysis of existing and proposed systems in terms of resolution, modulation transfer function, detection sensitivity, noise, and potential for improved diagnosis. Prerequisite: 261.

3 units, Win (Nishimura)

369B. Medical Imaging Systems II—Imaging internal structures within the body using non-ionizing radiation studied from a systems viewpoint. Modalities covered: ultrasound and magnetic resonance. Analysis of ultrasonic systems including diffraction and noise. Analysis of magnetic resonance systems including physics, Fourier properties of image formation, and noise. Prerequisite: 261.

3 units, Spr (Nishimura) alternate years, not given 1998-99

370. Information Systems Seminar—Lectures/discussion of topics and research areas in information systems. Topics: communication and informa-
tion theory, signal processing, systems and control, and optical information processing. (AU)
  1 unit, Aut (Widrow)
  Win (Cioffi)
  Spr (Gray)

371. Advanced VLSI Circuit Design—Overview of important issues in high performance digital VLSI design. Focus is from a system perspective (a fast processor, DSP, etc.), CMOS, circuits. Topics: wire modeling, logic families, latch design and clocking issues, clock distribution, RAMs, ALUs, I/O and I/O noise issues. Final project involves the design of a subsystem for a high-speed processor. Extensive use of SPICE. Prerequisites: 271, 313, or consent of instructor. Recommended: knowledge of C and C-shells.
  3 units, Spr (Horowitz)

372. Quantization and Data Compression—Theory and design of codes for quantization and signal compression systems (source coding systems), systems which convert analog or high bit rate digital signals to low bit rate signals while optimizing fidelity subject to available communication and storage capacity. Focus is theoretical and practical tradeoffs among bit rate, fidelity, and complexity in codes for quantization and compression. Topics: scalar quantization (PCM), transform and predictive codes, lossless (entropy) codes, vector quantizers designed using clustering and decision tree design algorithms, Shannon distortion-rate theory, high rate (asymptotic) quantization theory, and quantization noise theory. Prerequisites: 261, 278.
  3 units, alternate years, given 1998-99

  3 units, Win (Widrow)

  3 units, Spr (Widrow)

  3 units, Win (Narasimha)

  3 units, alternate years, given 1998-99

  3 units, Win (Cover)

  3 units, alternate years, given 1998-99

  3 units, Win (Kailath)

378B. Special Topics in Statistical Signal Processing—Topics from current research areas in signal processing, including new theoretical developments and novel applications. Partly project-based using a realistic real-time spacecraft simulator (under development) to study guidance and tracking of a spacecraft. Prerequisite: 378A.
  3 units, Spr (Kailath)
  alternate years, not given 1998-99

379A. Digital Communication I—Maximum-likelihood data detection, modulation methods and bandwidth requirements, bandpass systems and analysis, intersymbol interference and equalization meth-
ods, phase-locking, and synchronization. Prerequisites: 103, 278.
3 units, Win (Cioffi)

379B. Digital Communication II—Capacity calculation, cut-off rates, Viterbi Detection, partial-response methods, convolutional codes, trellis and lattice codes, shaping codes, encoder/decoder complexity. Prerequisites: 278, 379A.
3 units, alternate years, given 1998-99

379C. Advanced Digital Communication—Topics: transmit optimization for channels with intersymbol interference, combined equalization and coding, line coding design and analysis, discrete multitone (DMT), vector modulation, generalized DFE, spread spectrum.
3 units, Spr (Cioffi)
alternate years, not given 1998-99

380. Seminar on Computer Systems—Discussion of current research in the design, implementation, analysis, and use of computer systems ranging from integrated circuits to operating systems and programming languages. (AU)
1 unit, Aut, Win, Spr (Allison, Wharton)

382. Processor Design—Basic cycle time, processor area tradeoffs, and processor design studies. Vector processors, multiple instruction issue processors and shared memory multiprocessors. Queueing analysis of memory systems and I/O systems. Prerequisite: 282 or equivalent.
3 units, Win (Alpert)

383. Advanced Compiling Techniques—(Enroll in Computer Science 243.)

384A. Network Protocols and Standards—(Formerly 384.) Local area networks protocol standards: MAC Addressing, IEEE 802.1 bridging protocols (transparent bridging, source routing, virtual LANs); Internet protocol standards: the Internet Protocol (IPv4, IPv6, ICMP), routing protocols for interior gateways (EGP, BGP, Policy routing), IP multicast (IGMP, DVMRP, CBT, MOSPF, PIM); Asynchronous Transfer Mode (ATM): physical layer, ATM layer, ATM adaptation layer, ATM signaling, PNNI, LAN emulation, IP over ATM; ATM switching architectures. Prerequisite: 284 or Computer Science 244A.
3 units, Win (Alpert)

384B. Multimedia Networking and Communications—Multimedia traffic generation and characterization: audio compression, image and video compression standards (JPEG, H.261, MPEG-1, MPEG-2); advances in networking protocols. Technologies and infrastructures for multimedia applications: switching hubs, ISO-Enet, 100VG-AnyLAN, IEEE 802.1p, IP Multicast, resource reservation protocols (ST2 and RSVP), RTP, IEEE 802.14, ATM services and applications, broadband services to the home (fiber to the home, fiber to the curb, hybrid fiber coax); Audio-Video Conferencing Standards (ITU recommendations H.320 and H.323); data Conferencing Standards (ITU recommendation T.120); video servers. Prerequisite: 284 or Computer Science 244A.
3 units, Spr (Tobagi)

3 units, Spr (McKeown)

385. Special Seminars in Computer Systems—Seminars on current research topics in computer systems are given occasionally and are usually announced one or two quarters in advance. See the Time Schedule and bulletins in department office.

1-4 units, Aut, Win, Spr (McCluskey)

385B. Computer Architecture Seminar—Discussions of research problems in computer organization, memory hierarchy, machine representation, and emulation of conventional and abstract machines.
1-4 units, not given 1997-98

386A. Parallel Computer Architecture and Programming—(Enroll in Computer Science 315A.)

386B. Parallel Programming Project—(Enroll in Computer Science 315B.)

387. Error-Correcting Codes—Theory and implementation of codes for detection and correction of random and burst errors. Introduction to finite fields. Linear block codes, cyclic codes, Hamming codes, fire codes, BCH codes, Reed-Solomon codes. Decoding algorithms for BCH codes. Prerequisites: some familiarity with discrete mathematics and linear algebra.
3 units, Win (Tobagi)

388. Programming Language Design—(Enroll in Computer Science 342.)

389. Topics in Programming Systems—(Enroll in Computer Science 349.)

390. Special Studies or Projects in Electrical Engineering—Independent work under the direction of a faculty member. Individual or team activ-
391. Special Studies and Reports in Electrical Engineering—Independent work under direction of a faculty member; written report or written examination required. Letter grade given on the basis of the report; if not appropriate, student should enroll in 390.

392. Special Seminars—Special seminars and experimental courses are given on topics of current interest by specialists in the field. Announcements are made one or two quarters prior to presentation. See Time Schedule and bulletins in department office for current listing.

392B. Topics in CMOS Image—CMOS photodetectors; passive and active pixel sensors; pixel level processing, e.g., analog to digital conversion, artificial retina; issues in single chip digital camera design. Prerequisites: 214, 216, 271, or equivalents. Recommended: 315.

3 units, Spr (El Gamal)


3 units, Aut (Girod)

392D. Advanced Topics in Image Systems Engineering—Advanced topics of current research interest in image systems engineering. Emphasis on systems aspects. Topics: video transmission over the Internet, wireless video transmission, watermarking and authentication of images, joint audio-video processing, synthetic-natural hybrid coding, image data bases, automatic storyboard generation. Prerequisites: 261, 278. Recommended: 392C.

3 units, Win (Girod)

392G. Wavelets and Subband—Overview of filter banks and wavelets, their construction and properties, their relation to subband coding, and some generalizations. Expansion into orthogonal and biorthogonal bases, and overcomplete expansions (frames). Applications to audio, image, video compression, and computer vision and computer graphics. Prerequisite: 278 or equivalent.

3 units, Spr (Vetterli)


395. Electrical Engineering Instruction: Practice Teaching—Open to limited number of advanced graduate students in Electrical Engineering who plan to make teaching their career. Qualified students conduct a small section of an established course taught in parallel by an experienced instructor.

1-15 units, Aut, Win, Spr (Gray)

399. Topics in Computer Vision—(Enroll in Computer Science 328.)

400. Thesis and Thesis Research—Limited to students who have established candidacy for the degree of Engineer or Ph.D. A grade of 'S' indicates satisfactory work; no letter grade is assigned.

by arrangement

402A. Seminar: Topics in International Technology Management—Theme: U.S.-Asia joint alliances for R&D, engineering collaboration for competitiveness. Surveys best practices and problems in international cross-firm alliances with R&D goals. Strategic planning and organizational structure, intellectual property management, cross-cultural issues in international research environments, etc. Guest speakers from industry and government. (AU)

1 unit, Aut (Dasher)

402S. Seminar: Topics in International Advanced Technology Research—Theme: semiconductor device packaging and interconnect technologies, international trends and applications. Presentations by leading-edge research projects and major funding programs. Overview of state-of-the-art in these areas for selected electronic and optical technologies; technical challenges and directions of future development. Guest speakers from industry and government. (AU)

1 unit, Spr (Dasher)

410. Integrated Circuit Fabrication Laboratory—Preference to students pursuing doctoral research programs in which the facilities of the IC lab are used. Laboratory fabrication of silicon gate NMOS or CMOS integrated circuits. Emphasis is on practical aspects of IC fabrication, including silicon wafer cleaning, photolithography, etching, oxidation, diffusion, ion implantation, chemical vapor deposition, physical sputtering and wafer testing. Prerequisites: 212, 216, consent of instructor.

3-4 units, Win (Saraswat)

453. Geomagnetically Trapped Radiation—Charged particle trapping in planetary magnetic fields, and its importance in near-earth-space phenomena. Motion of charged particles in inhomogeneous magnetic and electric fields, adiabatic invariants, distribution functions and diffusion equation methods. Useful theorems for interpreting experi-
mental data. Source and loss processes and the physical mechanisms responsible for producing trapped radiation at the earth and other planets. Prerequisite: 142.

3 units, Win (Walt) alternate years, not given 1998-99

478. Special Topics in Information Theory—Review of channel equalization, different equalizer structures, including linear equalizers, DFEs and FSEs. Echo and NEXT cancellation. Training and tracking algorithms including fast startup. Tap wandering phenomenon, bias buildup and tap-leakage algorithm. Channel shortening (TEQ) and echo cancellation for DMT. Robust equalization and estimation. Bline equalization. Modeling and approximation of channel descriptions. State space approach to blind equalization.

3 units, Aut (Pal) alternate years, not given 1998-99


482. Advanced Computer Organization—Topics in high performance processor design focusing on pipelining, memory systems, and vector processors. Design project. Enrollment limited to 30. Prerequisites: 282, 382.

3-4 units, Spr (Olukotun)

483. Topics in Compilers—(Enroll in Computer Science 343.)

486. Advanced Computer Arithmetic—Number systems, floating point representation, state of the art in arithmetic algorithms, problems in design of high speed arithmetic units. Prerequisite: 282.

3 units, alterntate years, given 1998-99

487. Digital Signal Processing Architecture and Systems—The design and implementation of signal processing systems. Survey of a variety of architectures and the tools available to automate this task. Case studies in data communications and image processing. Topics: behavioral specification and hardware simulation of signal processing systems, hardware generation using silicon compilers, dedicated architectures, programmable architectures, real-time operating systems, array processors, architecture design tools, video compression, wireless communication and low-power implementation. Prerequisites: 271, basic DSP concepts, C programming language, and UNIX.

3 units, Win (Meng)


3 units, alternate years, given 1998-99


3 units, Spr (McCluskey) alternate years, not given 1998-99

492. Special Seminars—Special seminars and experimental courses are given on topics of current interest by specialists in the field. Announcements are made one or two quarters prior to presentation. See the Time Schedule and bulletins in department office.

by arrangement
dresses operational, strategic, and policy problems, using logical and mathematical models to provide insight and solutions. The department offers degree programs leading to a Master of Science, Engineer, and Doctor of Philosophy; it also participates in a program leading to a Bachelor of Science in Mathematical and Computational Science.

The department has special strength in theory and application within the following areas: continuous, discrete, and numerical optimization; probability and stochastic processes; dynamic systems and simulation; economics, finance, and investment; decision making, including decision analysis, dynamic programming, and planning under uncertainty; operations and services; corporate and individual strategy; and private and public policy issues.

Each year most faculty members are engaged in one or more projects, some with local industry or government, others in a national or international setting. Many of the projects provide opportunities for student participation, either working directly with the external organizations or through Stanford-based courses and research activities. Technical challenges encountered in such projects provide motivation and opportunity for methodological innovation. Data collection, processing, and presentation issues can be integral to future research efforts. Management challenges encountered in these projects can provide invaluable experience for a student’s subsequent professional practice.

CAREERS IN EES&OR

EES&OR helps students to prepare themselves for a variety of professional careers in universities, business, industry, and government. Graduates from the two predecessor departments, OR and EES, as well as from EES&OR, have pursued successful careers in consulting, enterprise management, financial analysis, government policy analysis, industrial research, line management, product development, project management, strategic planning, and university teaching and research. Some have founded companies specializing in financial services, high technology products, management and systems consulting, or software. Other graduates have helped establish new analytical capabilities in existing firms or government agencies.

Many graduates have become leaders in technology-based businesses, which have an increasing need for well educated, analytically oriented people who understand both business and technology. The EES&OR program is attractive to people with engineering, physical science, and mathematical science backgrounds as it complements their technical abilities with the conceptual frameworks needed to analyze problems of investment, management, marketing, operations, production, and strategic planning in a technical environment.

UNDERGRADUATE PROGRAMS

The department does not yet have an undergraduate degree program, although one is planned. However, EES&OR participates with the Departments of Computer Science, Mathematics, and Statistics in a program leading to a B.S. in Mathematical and Computational Science. See the “Mathematical and Computational Science” section of this bulletin.

GRADUATE PROGRAMS

Three primary programs of study lead to the degrees of Master of Science, Engineer, and Doctor of Philosophy in EES&OR. In addition, the department offers a cotermination B.S./M.S. program and a certificate program through the Stanford Center for Professional Development.

Students admitted for graduate study in EES&OR must have a background of undergraduate work that indicates a level of mathematical problem solving maturity customarily found in an undergraduate mathematics, engineering, or physical science program. At a minimum, mathematical preparation would include at least one year of college-level calculus; a background in linear algebra, probability, and computer programming; plus the capability to apply mathematical thinking to problem solving. Some familiarity with formal proofs is strongly recommended. Those needing a review of linear algebra, probability, or calculus are advised to attend the two-week intensive workshop offered by the department just prior to Autumn Quarter. Undergraduate coursework in economics is recommended but not required.

CERTIFICATE PROGRAM

The department offers a Certificate Program within the framework of the Non-Registered Option (NDO) program through the Stanford Center for Professional Development. A certificate in Management Science can be obtained by completing three core courses selected to cover three of the five core areas, plus one EES&OR elective course for the total of four courses.

Applicants apply through the Stanford Center for Professional Development as a NDO program participant. For additional information about the NDO application process, contact the center at (650) 723-3000.

All certificate applicants must meet department final approval for admission.
MASTER OF SCIENCE

The M.S. program in EES&OR prepares individuals with a solid foundation for a life-long professional career addressing important problems in industry, government, or individual decision making. Department requirements for the M.S. degree provide flexibility for meeting individual objectives consistent with developing depth in some particular area of concentration. The master’s degree may be a terminal degree program with a professional focus, or an exploratory vehicle to formulate and select a more advanced graduate program. The M.S. degree normally can be earned in one academic year (three academic quarters) of full-time work, although many students choose to enrich their education with up to an additional year’s work. The Honors Cooperative Program provides opportunities for employees of qualified local industry to earn an M.S. degree over a longer period, by taking one or two courses per academic quarter.

In addition to the University’s basic requirements for the master’s degree discussed in the “Graduate Degrees” section of this bulletin, a candidate must complete a predesigned program, organized to provide coherent depth through a set of courses that mesh both on content and schedule. Each program must include 45 units of coursework, 39 units of which must be completed with a grade point average (GPA) of at least 2.75 and the remaining course units may be taken for satisfactory/no credit. Each program requires at least 32 units from EES&OR, including a project course taken for a letter grade. In addition, each program requires an additional 13 units of course work, designed to give breadth and depth appropriate for individual academic goals. Some of these courses are offered by EES&OR and some by other departments relevant to the student’s academic goals. The department does not have a thesis requirement for the M.S. degree.

Each M.S. program incorporates six or more of the ten 200-level core courses, including a course in four or more of the five core areas: Optimization; Probability and Stochastic Processes; Systems and Simulation; Economics, Finance, and Investment; and Decisions. For students with more advanced backgrounds, a 300-level course from the same core area could be substituted for a 200-level course, but not more than two courses from any area can be used to meet the core requirements. Core courses must be taken for letter grades. (See “Courses” below for a list of core courses and project courses.)

ENGINEER

The EES&OR Engineer degree is for students desiring additional academic preparation beyond the master’s degree for a career of professional practice. The degree of Engineer requires a minimum of one academic year of study beyond the M.S. degree. University regulations governing the Engineer degree are described in the “Graduate Degrees” section of this bulletin.

The department requires the student to complete successfully (1) an approved M.S. program with a 3.0 grade point average (GPA); (2) an additional 45 units beyond the M.S. degree, spanning all five core areas and including, at the 300-level, six or more core courses covering four core areas; (3) approval of a thesis proposal by the thesis supervisor; (4) satisfactory oral presentation of the thesis to the thesis supervisor and one other departmentally-appointed faculty; and (5) completion of the Engineer thesis and approval by the thesis supervisor.

Admission to the Engineer degree program must be obtained from the department while the student is pursuing an M.S. degree. The admissions decision is based on the department’s evaluation of the applicant’s academic record, performance in independent work, potential for advanced study, plus the faculty ability to support and supervise such study. Before acceptance to the Engineer degree program, the student must have personally arranged for a faculty sponsor for thesis supervision and any requisite financial support. However, availability of thesis supervisors and of financial support for the Engineer degree is very limited.

DOCTOR OF PHILOSOPHY

The program leading to a Ph.D. in EES&OR is for students primarily interested in a career of research, teaching, or high-level technical work in universities, business, industry, or government. Therefore, the Ph.D. program emphasizes scientific and analytical foundations as well as more applied concepts useful for practice at the highest professional levels.

The Ph.D. degree requires a minimum of three academic years of study beyond the B.S. degree. University regulations governing the Ph.D. are described in the “Graduate Degrees” section of this bulletin. Admission to the doctoral program does not imply that the student is a candidate for the Ph.D. degree. Only after his or her application for doctoral candidacy has received official department and University approval does the student become a candidate. Not later than the Autumn Quarter of the second year in the department, the student should submit an application to participate in the department qualifying procedure.

In addition to University requirements, the student must successfully complete: (1) the department qualifying procedure; (2) a set of courses approved by his or her academic and dissertation advisers; (3) a dissertation, based on original research, which must be a contribution to knowledge; and (4) an oral examination near completion of the dissertation. All Ph.D. students must
satisfy requirements for an M.S. in EES&OR by the end of their second year and all who have not already earned a master's degree must apply for a Stanford M.S. prior to receiving the Ph.D.

The Ph.D. program is based on a requirement that successful candidates develop breadth, depth, and experience within our field. In order to receive approval, each student’s program must lead to sufficient breadth, depth, and experience, as outlined below.

**Breadth**—All Ph.D. programs must include at least one course in each of the five core areas, including, at the 300-level, six or more core courses covering four core areas. Because most 300-level core courses have prerequisite 200-level core courses, most Ph.D. candidates first take these prerequisites. Core courses all must be taken for letter grades and each student must earn at least a 3.5 grade point average (GPA) on the core courses. Each program must include at least 39 units of courses from EES&OR.

**Depth**—Each Ph.D. candidate must acquire additional depth in a primary and a secondary field of specialization consistent with the department’s strengths. The student is responsible for working with his or her advisers to define the primary and secondary fields. In the primary field of specialization, the program includes lecture courses, seminars, and independent reading and/or research to achieve mastery of the field sufficient for teaching that field at a major university. Typically, the dissertation would fall within the primary field. A similar, although possibly less extensive, depth is expected for the secondary field of specialization. The two fields together must include, at minimum, 18 units of graduate courses.

Although many fields of primary or secondary specialization are possible, several draw upon particular strengths of the department. These include specializations in Decision Analysis; Economic Analysis; Computation of Equilibria; Energy, Environment, and Natural Resources; Finance and Investment; Business and Technology; Mathematical Systems Analysis; Operations and Services; Optimization Theory and Algorithms; Policy Analysis; Mathematical Theory of Stochastic Systems.

**Experience**—Each Ph.D. program must include a project course taken for letter grade and may include additional non-academic professional experiences, such as an internship. The EES&OR project course used to satisfy requirements for an M.S. degree can also satisfy this requirement. (See “Courses” below for a list of core courses and project courses.)

The Ph.D. programs previously offered by the two predecessor departments, the Departments of Operations Research and of Engineering-Economic Systems, are available through choices of core courses and combinations of specializations. Students are free to pursue either of these two courses of study but are in no way limited to these two options.

**Operations Research**—Operations Research develops students who are skilled in the theory and algorithms of optimization, stochastic systems and modeling of common processes, and their application to decision making. It provides a comprehensive program of instruction in the mathematical foundations of operations research. Students pursue their primary specialization in optimization theory, algorithms, and applications, or in stochastic systems and modeling. Their secondary specialization is in the other of these two areas. Students are expected to take at least five 300-level courses in each of these two areas. Students also develop expertise in some additional areas of theory or application and take case studies in operations research.

**Engineering-Economic Systems**—Engineering-Economic Systems develops students skilled in problem solving and capable of applying engineering principles to application areas beyond those traditionally considered as part of engineering. Although mathematical analysis using formal models and logical representations is emphasized, analysis is complemented by careful attention to framing of issues, formulation of problems, and implementation of results. Methods are linked closely to applications. Students can pursue primary or secondary specializations in Decision Analysis; Economic Analysis; Energy, Environment, and Natural Resources; Finance and Investment; Mathematical Systems Analysis; Corporate Strategy; or other areas.

**Ph.D. MINOR**

Doctoral students throughout the University may complete a minor in EES&OR by taking 21 units of EES&OR courses. These must include four or more of the 300-level core courses, covering at least three of the five core areas. The selection must be approved by the student’s EES&OR adviser and by the EES&OR academic affairs chair.

**FINANCIAL ASSISTANCE AND ADMISSION**

Financial support is available on a competitive basis for qualified doctoral candidates. This includes a very limited number of course assistantships as well as research assistantships supported by faculty research grants and contracts. However, assistantships are, in most cases, awarded to students who have completed the qualifying procedure. Supplementary financial support can sometimes be obtained by grading, assisting in special projects, or from University loans.

We expect that most students in the EES&OR doctoral program will, after completing the quali-
fying procedure, be able to obtain financial support through a combination of research assistantships, course assistantships, and internships, all of which contribute directly to their educational programs. For most students, the critical period is the first two years of graduate work, when sufficient finances are needed to cover tuition and expenses.

Information about loan programs and need-based aid can be obtained from the Graduate Financial Support section of the Financial Aid Office. The application forms for admission may be obtained from Graduate Admissions, the Registrar’s Office. Applications for the Ph.D. Degree Program, with consideration for merit based financial awards must be made by February 1 of the preceding academic year, and must be accompanied by a completed application for admission. Merit based financial awards for first-year Ph.D. candidates may take the form of fellowships, combination fellowships/assistantships, or assistantships. Applications for the master’s degree program, the Engineer degree program, and the Ph.D. degree program (without consideration for merit based financial awards), are accepted until April 15. Research assistantships, however, are awarded by the individual faculty research supervisors, not by the department, and have no such deadline.

Except in unusual circumstances, admission is limited to the Autumn Quarter because courses are arranged sequentially with basic courses and prerequisites offered early in the academic year.

INTERNSHIPS

Since most complex system problems cannot be realistically duplicated within a university, some internships are available to help Ph.D. students develop the ability to solve system problems by working on real problems.

Internships may be found in large industrial firms; in companies and research groups concerned with the design, operation, and planning of complex projects and systems; and in government agencies. The duration of an internship ranges from six to twelve months depending on the time required to successfully complete the project. Internships for international students must conform to visa restrictions. Internships are not required, but are strongly encouraged as integral parts of a Ph.D. program.

RESEARCH AREAS

Students should gain experience in applying EES&OR concepts in at least one specific problem area. This experience can be gained through an internship, research projects, and special courses that concentrate on applying EES&OR concepts to specific areas. The current major research programs of the department are listed below. Faculty active in these programs are indicated.

OPTIMIZATION

Numerical Optimization—(Professors Murray, Saunders.) The Systems Optimization Laboratory (SOL) is a central focus for EES&OR optimization research and provides opportunities for students to gain firsthand experience with computational methods, to participate in research on new algorithms, and to learn about modeling complex systems. Within SOL, there is a long-standing research program on algorithms for constrained optimization. This involves fundamental research on mathematical methods for linear and nonlinear programming, as well as techniques for implementing the methods as efficient and reliable computer software. We have a special interest in algorithms for large-scale problems. General-purpose packages developed at SOL (for example, MINOS and NPSOL) have been distributed to thousands of sites world-wide. Feedback from users brings about many fruitful collaborative efforts with industry, government, and academia. Recent applications include: design of both yachts in the 1995 America’s Cup final; on-line control of transmission networks for electricity and gas; prediction of oil prices by the Federal Reserve; climate modeling for the greenhouse debate; determination of forces on the thigh bone prior to prosthesis insertion; optimal control of the DC-X experimental single-stage VTOL rocket.

Stochastic Optimization—(Professors Dantzig, Infanger.) This SOL research program concerns techniques for solving mathematical models of decision problems whose parameters (coefficients, right-hand sides) are not known with certainty but are assumed known from their distributions. Such models arise in all practical problems of planning, scheduling, designing, and controlling complex situations. The models are extremely large. New breakthrough methods, based on sampling, now make them solvable. Activities include fundamental theoretical research on algorithms for stochastic linear and nonlinear programs, efficient software implementations on serial and parallel computers, and applications research in diverse areas. Recent applications include: planning, scheduling, and control of electric power systems; design and operation of production lines; portfolio optimization and asset/liability management; vehicle placement and scheduling in transportation, optimal design of communication systems.

Complementarity Problems and Equilibrium Programming—(Professors Cottle, Dantzig, Eaves.) The research program is concerned with the mathematical study of properties of complementarity problems, the development of efficient algorithms for their solution, and the expansion of their use in practical problems. A central and unifying theme in the analysis of optimization and equilibrium problems, complementarity problems are special systems of equations and inequalities.
Such systems arise in a wide range of theoretical and applied settings. Because of their pervasive and essential occurrence, it is efficient to isolate and study them. Complementarity conditions are central to the study of nonlinear programming, fixed points, variational inequalities, duality theory, control problems, and generalized equations. Path-following, homotopy methods and/or deformations are used in the study and solution of complementarity and general equilibrium problems. Examples arise in financial optimization, curve fitting, economic and market equilibria, equilibria in games of conflict, contact mechanics, structural engineering, network optimization, traffic flow, and electronic circuits.

**Network Optimization, Design, and Equilibria**—(Professors Bambos, Chiu, Dantzig, Eaves, Infanger, Shachter, Veinott.) Network models are widely used in industry, government, and engineering for supply, distribution, manufacturing, transportation, communication, construction, mining, investment, scheduling, sequencing, routing, and reliability. Networks and graphs also serve as fundamental tools to study the structure of matrices, Markov chains, probabilistic dependence, optimization problems, and so on. The research in this area focuses on single-commodity, multi-commodity, dynamic, equilibrium, and stochastic network flow and design problems. The costs typically exhibit economies, diseconomies, or constant returns to scale. The emphasis is on the identification and/or development of the relevant structural properties of such systems; efficient methods of finding optimal or near-optimal flows, designs, and equilibria; and on applications to a wide variety of industrial, public, and engineering problems.

**Lattice Programming**—(Professor Veinott.) This area is concerned with predicting the direction of change in global optima and equilibria resulting from changing conditions based on problem structure alone without data gathering or computation. Rooted in the theory of lattices, this work is also useful for characterizing the form of optimal and equilibrium policies, improving the efficiency of computation and suggesting desirable properties of heuristics. Applications range widely over dynamic programming, statistical decisions, cooperative and non-cooperative games, economics, network flows, Leontief substitution systems, production and inventory management, project planning, scheduling, marketing, reliability and maintenance, and so on. Recent applications include price and warranty setting in the automotive industry, and optimally stepping up pressure in gas pipelines.

**PROBABILITY AND STOCHASTIC PROCESSES**

**Stochastic Modeling and Queueing Analysis**—(Professors Bambos, Glynn, Iglehart, Shachter.) This research program focuses on modeling and analysis of systems with essentially random operational parameters, using established techniques of probability and stochastic processes as well as developing novel ones. Such systems arise in various areas of engineering, business organization, production management, and so on. A key issue is the modeling of queueing processes in these systems in order to understand the dynamics of delay and the emergence of performance bottlenecks limiting the system throughout. Closely related research in stochastic scheduling and resource allocation aims at controlling such systems efficiently, in order to optimize their performance (maximize output, minimize delays, and so on.) Key application areas include communication networks, computer systems, flexible manufacturing systems, parallel and distributed processing networks, business organization, service systems, production management, and so on.

**SYSTEMS AND SIMULATION**

**Simulation Methodology**—(Professors Glynn, Iglehart.) Computer simulation of large, complex stochastic systems is often the only alternative for evaluating their performance. Research has, as a goal, the development of computational and statistical techniques which will improve the efficiency of simulation methods and extend their applicability to a wide class of stochastic systems. Recent work has applied importance sampling to rare event simulations with applications to ATM communication switches and fault tolerant computer systems. Another recent application of methodology has been to polling systems in a manufacturing context. Contributions have also been made to the simulation of stochastic differential equations which arise in financial engineering.

**Intelligent Systems**—(Professors Chiu, Fehling, Holtzman, Shachter, Tse.) The research has two major objectives. First, it seeks to advance understanding of problem-solving in human organizations, ranging from small cooperative teams to large-scale, highly distributed enterprises: strategic business planning, large scale production management, supply-chain design and management, new product development, medical policy formation and decision making, disaster-relief planning, and military logistics and transportation deployment. Second, the program develops new methods and computer-based technology to enhance organizational problem-solving, focusing on the design, development, and evaluation of computer-based intelligent systems that aid organizational decision makers in coordinating
Efforts to solve complex problems. Topics of particular interest include algorithms automating elements of large scale planning processes and autonomous computer agents that automate more routine problem-solving and coordination activities. Much of the basic and applied research in this program is conducted through the Organizational Dynamics Center, directed by Professor Fehling. The center focuses attention on problem solving and decision making in human organizations.

ECONOMICS, FINANCE, AND INVESTMENT

Investment—(Professors Dantzig, Johnson, Luenberger.) The Investment program in EES & OR is devoted to building a rigorous foundation for the analysis of investment opportunities and the management of investment portfolios. As such, the program incorporates areas of (1) corporate finance (the study of how corporations select and manage investment projects and how they choose their financial structure), (2) financial economics (the equilibrium analysis of financial markets), (3) financial engineering (the study of derivative securities, such as options and futures, and the design of new securities), (4) financial risk management (the design of hedging strategies), (5) portfolio theory (the design and management of investment portfolios), (6) fundamental analysis (the study of how economic factors influence investment value), and (7) technical analysis (the estimation of future asset prices based on their past values). Current research of the Investment program in EES&OR focuses on several important areas. One is the analysis and management of investment projects whose cash flow streams are uncertain and whose payoffs span several years. A new methodology which combines the theory and the mathematics of derivative securities, optimal portfolio choice, and asset pricing is being developed. A second area is the development of portfolio design methods which capitalize on the tools and resources made available by recent advances in information technology. A third area is the development of simulation and optimization methods to solve large investment problems. The general goal of all research in the program is to develop effective and implementable methods for addressing complex practical problems in investment.

Energy, Natural Resources and the Environment—(Professors Dunn, Manne, Sweeney, Weyant.) Research activities center around the Energy Modeling Forum (EMF) and the International Energy Workshop (IEW). Based in EES&OR, the EMF provides a world-wide forum for improving use and usefulness of models of energy and of the environment. The EMF is directed by Professor Weyant. Current EMF studies focus on integrated assessment of global climate change, restructuring electricity markets, and energy policy in Japan. The IEW, directed by Professor Manne, provides an international forum for discussion and comparison of forecasts of energy market conditions. Theoretical and empirical research projects focus on both depletable and renewable natural resources, including energy, biological, mineral, and environmental resources, although greatest attention is focused on energy and associated environmental impacts. Current research efforts include economic responses to global greenhouse gas accumulation and quantification of externalities associated with energy and non-energy commodities.

Systems Economics—(Professors Eaves, Johnson, Luenberger, Tse.) A response to the growing magnitude and complexity of economic decision problems, this research area combines economic theory in finance, general equilibrium theory, computational methods, and decision theory with the problem-solving viewpoint and techniques of systems analysis. Developing and solving realistic general equilibrium models is a major opportunity and challenge for improving the management of competition and trade and for predicting price reactions to market changes.

Organizational Analysis—(Professors Fehling, Luenberger, Sweeney, Tse.) The program studies incentives and information in organizations and inter-organizational systems. Incentives include those created by rules governing activities such as information sharing, cost allocation, and transfer pricing within an organization.

DECISIONS

Decision Analysis—(Professors Fehling, Howard, Shachter.) Decision analysis is a philosophy, a body of knowledge, and a professional practice for the logical illumination of decision problems; it simultaneously considers the uncertain, dynamic, and complex consequences of a decision, as well as the assignment of value to its consequences. EES&OR research is dedicated to extending the theoretical foundations, increasing the effectiveness of practice, and expanding the field of application of decision analysis. The research program maintains a close relationship with professional decision analysts working on major decision problems. Internships are available at several local consulting firms. Much of the research is conducted through the Decisions and Ethics Center directed by Professor Howard. The center studies how to make decisions both effectively and ethically. Current research areas include (1) designing of agreements to govern actions of several participants to a venture, (2) developing procedures for clarifying unstructured areas of concern as a first step in formulating decision problems, (3) analyzing decisions involving risks.
focuses on developing basic principles and systematic methodologies for performance evaluation of complex stochastic systems which are typically intractable by precise mathematical analysis. Key issues include the specification of meaningful performance measures, the identification of performance bottlenecks, and the design of efficient operational schemes or algorithms to improve performance by alleviating the bottlenecks. Simulation theory and practice play a key role in this research area, and important issues include the efficient design of quick, reliable simulation experiments and the meaningful interpretation of the simulation data. Current application areas include communication networks, computer systems, flexible manufacturing systems, parallel and distributed processing networks, business organization, production management, service systems, and so on.

**Inventory Management**—(Professor Veinott.) This area focuses on the development and analysis of models to facilitate efficient management of inventories of products and service capacity. These problems are addressed in environments in which there is often uncertainty about demand, supply, prices, quality and product life; costs exhibit economies, diseconomies, or constant returns to scale; there is often competition; decisions are made sequentially as new information is acquired. Issues addressed include: where, when, and how much to stock at various points of a supply chain; how to price products and services; how to size and time expansion of capacity; how to respond to competition. Recent applications include optimal overbooking policies for airline seat inventories and optimal paper-mill supply policy.

**Underground Mining**—(Professor Eaves.) The management of production, development, sampling, analysis, and exploration in an underground mine is a complex operation. The effort here is to study mining operations, strategy, and policy and to use mathematical modeling and optimization to assist in improved management of these systems.

**Management of Projects**—(Professors Eaves, Fehling, Tse.) The focus is on improving decisions in operations, strategy, and policy in an enterprise. The basic premise is that better decision making is available through an interaction of mathematical modeling and institutional expertise. Designing a team, building mathematical models, collecting and processing data, comparing decisions from models and experts, engaging experts, revising models, altering the culture in an enterprise, and so on, are processes that have both predictable and manageable elements. This research is directed to the common features of applied mathematical modeling with the intent of developing insights and guidelines for avoiding problems and
fostering success. The students and faculty of EES&OR are routinely involved in dozens of projects (national and international) each year; some are managed formally and others more casually. In addition, selected past cases are archived. There is both the interest and opportunity for studying the nature of and management of mathematical modeling in an enterprise.

**STRATEGY**

*Business and Technology*—(Professors Howard, Tse.) This area focuses on the successful creation and management of high technology companies and on the use of advanced technology to change and improve practices and decision making processes of business enterprises so as to secure new competitive positions in the changing global environment. Research combines analytical thinking with case studies to develop fundamental principles applicable to high technology business and to the use of advanced technology in business decisions and enterprise management. Research topics in this program include product and process innovation, marketing high technology products, investment in entrepreneurship, and business re-engineering.

**POLICY**

*National Security Policy*—(Professors May, Perry.) Government policy research focuses on issues which involve political, economic, and technological factors in an essential way and which are likely to have long-term impact. Examples include policies with respect to the management and control of weapons of mass destruction and other modern weaponry, exports control, security aspects of energy supply questions, policies with regards to the utilization of space, and policies with regards to the diffusion of information technologies. Research is carried out in collaboration with the Center for International Security and Arms Control.

*Energy and Environment Policy*—(Professors Manne, Sweeney, Weyant.) Analyzes policies at the state and national levels concerned with the management of depletable and renewable natural resources and the environment. Current research projects focus on the regulation of public utilities providing natural gas and electric power. The policy work is integrated with the research within the Energy, Natural Resources, and the Environment area (described above.)

*Medical Policy*—(Professors Howard, Shacht-

*Telecommunications and Information Policy*—(Professors Bambos, Chiu, Dunn.) Analyzes policies concerned with the creation, distribution, and utilization of information and communication products, with particular emphasis on the new and evolving science-based information technologies. These activities are closely linked to the Center for Telecommunications.

*Transportation Systems*—(Professor Chiu.) This research views transportation systems as economic enterprises. The focus is on integrated congestion management. Research topics include supply and demand equilibrium analysis, congestion pricing strategies, economics of congestion, policy evaluation and analysis. The impact of technology on transportation planning and the role of telecommunications technology in transportation are also examined.

**COURSES**

(AU) indicates that the course is subject to the University Activity Unit limitations (8 units maximum).

Core Courses:
- Optimization: 211, 212, 311
- Probability and Stochastic Processes: 221, 222, 321, 322
- Systems and Simulation: 231, 232, 331, 332
- Economics, Finance, and Investment: 241, 242, 341, 342
- Decisions: 251, 252, 351, 352
- Project Courses:
  - 401, 402, 434, 442, 452, 453, 455, 483, 495

Course descriptions, organized by area, are listed below. Core courses numbers end with 1 or 2. Previous course numbers in either Engineering Economic Systems (EES) or in Operations Research (OR) are indicated after the title.

**GENERAL**

208A,B,C. *Practical Training*—(Formerly EES 395/OR 395.) Students obtain summer employment in a relevant industrial or research activity, chosen to enhance their professional experience, consistent with the degree program they are pursuing. Report on the experience required. Sequence can be taken over three summers. Enroll through Student Services office.

3 units, Sum (Staff)

401. *Case Projects in Decision Engineering*—Development of communication, organization, and modeling skills as they relate to decision making in operations, strategy, and policy. Student teams compete in case projects. Emphasis is on problem identification, yield consideration, teamwork, project scheduling, task definition, task allocation, task
amalgamation, group behavior, technical writing, public speaking, critique and defense, and the use of software, literature, principals, and experts. Enrollment limited. Prerequisites: three courses in EES&OR or equivalent. Corequisites: three more courses in EES&OR or equivalent.

4 units, Win (Eaves)

402. Sponsored Projects in Decision Engineering—Each student team addresses a project in operations, strategy, or policy as sponsored by a business, medical, or government client. Emphasis is on: team interaction with the sponsor, model construction and analysis, data collection, use of literature and experts, formulation of recommendations, and communication. Enrollment limited. Prerequisites: 401, six courses in EES&OR or equivalent, consent of instructor. Corequisites: three more courses in EES&OR or equivalent.

4 units, Spr (Eaves)

405. Introduction to Engineering-Economic Systems and Operations Research—(Formerly EES 290.) Introductory lectures by faculty and research staff describing department research programs. (AU)

1 unit, Aut (Staff)

406. Colloquium in Engineering-Economic Systems and Operations Research—(Formerly OR 290.) Presentation of current research and professional practice. (AU)

1 unit, Aut, Win, Spr (Staff)

407. Teaching Assistants Workshop—Methods of effective pedagogy and course management issues. Designed for students who have been or will soon be teaching/course assistants. Topics depend on the interests of the students, especially problems they are currently encountering.

1 unit (Shachter)
alternate years, not given 1998-98

408. Directed Reading and Research in Engineering-Economic Systems and Operations Research—(Formerly EES 290/292 OR 299.) Directed study and research on a subject of mutual interest to the student and faculty member.

1 or more units, any quarter (Staff)

409. Thesis and Thesis Research—Limited to students who have established candidacy for the degree of Engineer or Ph.D.

1-15 units, any quarter (Staff)

OPTIMIZATION

111. Introduction to Optimization—(Formerly OR 152.) (Enroll in Engineering 62.)

4 units, Aut, Spr (Staff)


3 units, Aut (Shachter)


3 units, Aut (Eaves)


3 units, Win (Cottle)

313. Vector Space Optimization—Optimization theory from the unified framework of vector space theory—i.e., treating together problems of mathematical programming, calculus of variations, optimal control, estimation, and other optimization problems. Emphasizes geometric interpretation. Duality theory. Examples. Topics: vector spaces, including function spaces; Hilbert space and the projection theorem; dual spaces and the separating hyperplane theorem; linear operators and adjoints; optimization of functionals, including theory of necessary conditions in general spaces, and convex optimization theory; constrained optimization, including Fenchel duality theory. Prerequisite: Math. 115.

3 units, Aut (Luenberger)


3 units, Win (Murray)
316. Linear Complementarity—(Formerly OR 348.) Theory of the linear complementarity problem, its applications, and algorithms for its solution. Elements of quadratic programming theory. Pivotal algebra, Schur complements, and matrix classes. Analytic existence theorems. Lemke's algorithm, the principal pivoting method and degeneracy resolution techniques. Indirect algorithms. Prerequisite: 311 or consent of instructor.
3 units (Cottle)

3 units, Aut (Veinott)

318. Linear Programming—(Formerly OR 340.) Basic theory plus lab for learning about the numerical, software, and application aspects of the field. Formulation of standard linear programming models. Alternative techniques for solving linear programs. Theory of polyhedral convex sets, linear inequalities, alternative theorems, and duality. Variants of the simplex method, dual simplex method, product form of the inverse. Upper bounding, sensitivity analysis, economic interpretations. Large-scale linear programming, decomposition principle. Prerequisite: Math. 113 or consent of instructor.
3 units, Aut (Staff)
1 unit lab (Staff)

418. Topics in Mathematical Programming—(Formerly OR 370.) Seminar with presentations by students and invited speakers. Introduction to techniques for solving structured linear programs. Theory of polyhedral convex sets, linear inequalities, alternative theorems, and duality. Variants of the simplex method, dual simplex method, product form of the inverse. Upper bounding, sensitivity analysis, economic interpretations. Large-scale linear programming, decomposition principle. Prerequisite: Math. 113 or consent of instructor.
3 units, Aut (Staff)

PROBABILITY AND STOCHASTIC PROCESSES

4 units, Win (Staff)

221. Probabilistic Analysis I—(Formerly EES 221A.) Applied probability with a unique perspective: probabilistic analysis viewed as the structuring, processing, and presentation of probabilistic information. Introduction of Axioms of Probability Measures, the concepts of sample space, conditioning, random variables, distribution functions and various expectation, etc., as the means to achieve probabilistic analysis. Concepts, tools, and modeling. Problem solving alone and beyond those achievable with only an analytical closed-form approach. Examples from social, legal, medical, and engineering systems. Prerequisite: working knowledge of calculus. Recommended: elementary knowledge of working with a spreadsheet.
4 units, Aut (Chiu)

222. Probabilistic Analysis II—(Formerly EES 222.) Continuation of 221. Topics: limit theorems, discrete and continuous time Markov chains, renewal processes, queuing theory, and transform analysis. Emphasis on building a framework to formulate and analyze probabilistic systems. Prerequisite 221.
3 units, Win (Chiu)

3 units, Win (Glynn)

322. Stochastic Calculus and Control
3 units (Glynn)

SYSTEMS AND SIMULATION

231. Dynamic Systems—(Formerly EES 201 A.) Introductory. Goal: train students to think dynamically in decision making, recognize and analyze dynamic phenomena in diverse situations. Concepts: formulation and analysis; state-space formulation; solutions of linear dynamic systems, equilibria, dynamic diagrams; eigenvalues and eigenvectors of linear systems, the concept of feedback; structural properties including controllability and observability. Prerequisite: Math. 103 or equivalent.
4 units, Win (Tse)

232. Simulation—(Formerly OR 253.) Generation of uniform and non-uniform random numbers, discrete-event simulations, simulation languages, design of simulations, statistical analysis of the output of simulations, variance reduction, optimization via simulation, applications to modeling stochastic systems in computer science, engineering, and operations research. Prerequisites: a working knowledge of FORTRAN, PASCAL, or C; 222 or equivalent.
3 units, Spr (Glynn)
234. Symbolic Programming for Building Intelligent Systems—(Formerly EES 284.) Basic symbolic programming techniques to build computational models of intelligent, problem solving systems. Review of mathematical basis. Concepts and techniques underlying modern programming: data abstraction and abstract data types; procedural abstraction, scoping, and closure; basic structures (conditional branching, recursion, and iteration); modularity; object-oriented programming; methods used by intelligent-systems builders; pattern-directed flow of control; search processes; unification and logical inference; and advanced control structures to support rule-based programming, agenda-based control, and multi-tasking. Mathematical foundations of symbolic programming. Exercises/project provide practice with symbolic programming methods using SCHEME, a dialect of LISP. Prerequisite: courses or hands-on experience with a high-level programming language (LISP, C, or Pascal). 3 units (Fehling) alternate years, not given 1998-99

237. Analytical Modeling in Spreadsheets—Examines analytical techniques such as linear and integer programming, Monte Carlo simulation, forecasting, decision analysis and Markov chains in the environment of the spreadsheet. Materials include spreadsheet add-ins for implementing these and other techniques. Emphasis is on building intuition through interactive modeling, and extending the applicability of these type of analysis through integration with existing business data structures. 3 units, Aut (Savage)

238. The Art of Mathematical Modeling—(Formerly EES 208.) Constructing mathematical models is essential to the successful application of quantitative analysis to unexplored problem areas. The practical and philosophical issues associated with the modeling process. Purpose is to improve one’s ability to build formal structures for solving practical problems. Students are given first-hand experience in constructing and critiquing mathematical models, emphasizing ingenuity and creativity rather than mathematical models or techniques. Prerequisites: familiarity with calculus and probability. 3 units, Win (Smallwood, Morris, Schwartz)

331. Optimal Dynamic Systems—(Formerly EES 201B.) Nonlinear system analysis; stability, Liapunov functions, general summarizing functions. Optimal control theory and the Pontryagin maximum principle; problems with inequality constraints, transversality condition, discounting cost, infinite horizon problem; the Hamilton-Jacobi-Bellman equation; adaptive learning and control systems. Applications include optimal economic growth, control of predator/prey systems, spread of product innovation. Prerequisite: 231. 3 units, Aut (Tse)

332. Simulation Theory—(Formerly OR 353.) Emphasis is on the theoretical foundations of simulation methodology. Generation of uniform and non-uniform random variables. Discrete-event simulation and generalized semi-Markov processes, Output analysis (autoregressive, regenerative, spectral, and stationary times series methods.) Variance reduction techniques (antithetic variables, common random numbers, control variables, discrete-time, conversion, importance sampling). Stochastic optimization (likelihood ratio method, perturbation analysis, stochastic approximation). Simulation in a parallel environment. 3 units, Aut (Iglehart)

334. Intelligent Systems: Theory and Development Methods—(Formerly EES 285.) Theories and methods for building computational models of intelligent systems. Interdisciplinary perspectives on problem solving and decision making. Modeling intelligent organization systems that work via coordinated actions of multiple, participating actors in complex, dynamic domains. Advanced data structures to encode problem solving knowledge and belief, models of dynamic time-dependent processes, problem solving algorithms for diagnosis and planning, heuristic methods for controlling search and inference, symbolic inference algorithms for decision making, machine learning methods, and generic intelligent-system architectures, including multi-actor architectures (Plural-SOAR, VDT, and Schemer.) Prerequisites: 211, 234, 252 or equivalent symbolic programming experience. Recommended: some work in cognitive science and organizational design in sociology or economics. 3 units (Fehling) alternate years, given 1998-99

434. Intelligent Systems Projects—(Formerly EES 286.) Development of intelligent systems that model or support organizational work. Examples of intelligent systems used to model and analyze organizational practices and built to aid organizational workers in performing tasks, e.g., control of operations enterprise-level management, organizational planning, and policy design. Examples from application domains e.g., health-care, strategic management, and manufacturing. Intelligent systems for organizational analysis or support. Student teams design/build prototypes of intelligent system applications to analyze or support performance of some well-defined task in a real-world organization. Prerequisites: 234, 334, or equivalent introduction to symbolic programming and AI. Recommended: work in organizational design or computer-supported collaborative work. 3 units (Fehling) alternate years, given 1998-99

435. Research Topics on Intelligent Systems—(Formerly EES 401A,B,C) Participants critically discuss current theory and research on intelligent
systems and their applications. Seminar focuses on
topics addressed in 436; computational methods for
decision theoretic planning and reasoning about
action, utility-guided categorization and situation
assessment under uncertainty, intelligent control of
manufacturing processes, and intelligent systems
architectures.

1-4 units, Aut, Win, Spr (Fehling)

436A,B,C. Organizational Analysis: Computational
and Mathematical Approaches—(Formerly EES 386A,B,C.)
Advanced seminar focuses on
dynamic performance of real-world organizations
and organizational participants, and their interac-
tions with the social and physical environment.
Explores processes (planning, activity management,
and learning) using computational and mathemati-
cal models to support and improve organizational
work. Participants critically review contributions to
organizational analysis and support technology
drawing on social and behavioral science, econom-
ics, systems and decision sciences, and computer
science and AI.

1-4 units, Aut, Win, Spr (Fehling, Levitt)

ECONOMICS, FINANCE,
AND INVESTMENT

241. Economic Analysis—Principal methods of
the economic analysis of the production activi-
ties of firms (production technologies, cost and
profit; perfect and imperfect competition); indi-
vidual choice (preferences and demand); and the
market based system (price formation, efficien-
cy, welfare.) Emphasis is on the analytical foun-
dations and the practical applications of the meth-
ods presented. See 341 for continuation of 241.
Recommended: 211.
4 units, Win (Johnson)

242. Investment Science—(Formerly EES 246.)
Introduction to modern quantitative investment anal-
ysis: theory and practical application. Objective is
to teach how modern investment concepts can be
used to evaluate and manage opportunities, struc-
ture portfolios, and use sophisticated investment
products including stocks, bonds, mortgages, and
annuities. Topics: deterministic cash flows (time-
value of money, present value, internal rate of
return, term structure of interest rates, bond portfo-
llo immunization, project optimization); mean-var-
iance theory (Markowitz model, capital asset pric-
ing); dynamic and uncertain cash flows. Emphasis
is on translating theory into actual procedures. Ex-
amples of applications for every major topic. Group
project devoted to application of the theory. See 342
for continuation of 242.
3 units, Win (Luenberger)
Sum (Feinstein)

246. Economics of Natural Resources—(Former-
ly EES 255.) Intertemporal economic analysis of
natural resource use, particularly energy and includ-
ing air, water, and other depletable mineral and
biological resources. Emphasis is on an integrating
theory for depletable and renewable resources. Stock-
flow relationships; optimal choices overtime; short-
and long-run equilibrium conditions; depletion/ext-
tinction conditions; market failure mechanisms
(common-property, public goods, discount rate dis-
tortions, rule-of-capture); policy options. Prerequi-
site: 241 or Economics 51.
4 units, Aut (Sweeney)

249. Growth and Development—How to assess
the new investment opportunities in the countries of
the Pacific Rim and other fast growing economies.
Useful for those guiding their country's develop-
ment choices. Topics: the mechanism of economic
growth, the equation of interest, optimal growth,
economic interpretation of the calculus of vari-
tions and optimal control theory results, uncertain-
ty, tools for evaluating long-term growth rate, geo-
metric moments, the exponormal distribution. In-
vestment incentives, country risk indices. The long
view: rule of law vs. rule of people. Practical cases
from Ireland, E. European countries, China, and
other E. Asian countries.
3 units, Sum (de La Grandville)

341. Economic Analysis—(Formerly EES 212B.)
Builds on 241 concepts. Market structure and indus-
trial organization (oligopoly, strategic behavior of
firms, game theoretic models); economics of uncer-
tainty; general equilibrium theory and economic
efficiency (formulation, Walras' Law, existence,
uniqueness, duality between efficiency and general
equilibrium; trade); intertemporal equilibrium and
asset markets; macroeconomic analysis and eco-
nomics growth (accounting identities, general equi-
librium perspective); public goods, externalities.
Provides background for additional advanced eco-
nomics. Prerequisite: 241.
3 units, Spr (de Villier)

342. Advanced Investment Science—(Formerly
EES 247.) Advanced topics and research in the
theory and application of investment concepts. Top-
ics: futures contracts, continuous and discrete time
models of stock price behavior, basic options theo-
ry, advanced options techniques, models and appli-
cations of stochastic interest rate processes, hedging
problems, evaluation of risky projects, and optimal
portfolio growth. Computational issues and general
theory. Teams work on independent projects that
apply the principles. Prerequisite: 242.
3 units, Spr (Luenberger)

343. Microeconomics—(Formerly EES 213.) Mi-
croeconomics from a unified viewpoint, based on
benefits to individuals, groups, and firms. Basic
foundations of consumer and production theory and
efficiency and equilibrium theory from a benefit
viewpoint. Types of equilibrium models and how
they may be solved efficiently. Externalities, wel-
fare, uncertainty, and information emphasizing the benefit viewpoint. Prerequisite: 241.

3 units (Luenberger)
alternate years, not given 1998-99

344. Equilibrium Programming—(Formerly OR 342.) Mathematical models of equilibria in economics and in conflict. Extensive form games, general and partial equilibrium economic models, Nash equilibria. Solution of equilibrium models by the homotopy principle: deform the system to an easily and uniquely solved one, and follow the solution of the system as it is deformed, with retrogressions, back to the original system. Piecewise linear and differential homotopies and curve following. Subdivisions, atlases, regularity, degree, fixed points, stationary points, general and special case algorithms. Prerequisite: 211.

3 units, Win (Eaves)

346. Economic Analysis of Market Organizations—For second-year or more advanced graduate students. Applies theories of microeconomics and operations research to decision behavior and mechanism design in market organizations with asymmetric information structures. Topics: game theory, economics of information, and nonlinear pricing. Applications: priority pricing of congested services, emission trading of pollutants, design of competitive markets for electric power, competitive product pricing, etc. Prerequisite: basic knowledge of microeconomics, optimization, probability theory, and decision theory. Recommended: familiarity with mathematical modeling and skills in computer programming.

3 units, Aut (Chao)

347. Capital Investment and Financing Decisions—Optimal capital investment and financing decisions for firms operating in a dynamic and uncertain environment. Forecasting and valuing project cash flows. Designing and managing projects to create and capitalize on operating options and follow-on investment opportunities. Financing alternatives and the relationship between investment type and optimal financial structure. Prerequisites: basic finance theory (equivalent of 242 or Industrial Engineering 235.)

3-4 units, Spr (Johnson)

348. Hedging and Investing with Derivatives—Design, evaluation, and implementation of hedging and investment strategies using derivatives. Practical, problem-motivated techniques for a wide range of application areas. Emphasis is on exchange traded derivatives, private contracts, and business management strategies designed to achieve similar goals when no appropriate exchange traded instruments exist.

3 units, Spr (Johnson, Crawford)

441. Economic Analysis Practice—(Formerly EES 218.) Project focusing on applications of economic analysis. Student teams model/analyze/communicate a pending economic issue in conjunction with outside group and with faculty guidance. Past projects: forecasting model for Moscow office space development; analysis to South Bay of proposed military base closure; pricing analysis for glass recycling facility; California's zero-emission vehicle mandate; Devil's Slide bypass options.

4 units (Sweeney)

442. Investment Projects—Students work in teams to address a practical problem in investment. Faculty assist in identifying appropriate projects and in developing students' understanding of relevant analytical tools. Students assume full responsibility for project analysis and presentation to the decision maker.

4 units (Sweeney)

446. Economic Analysis of Market Organizations—For second-year or more advanced graduate students. Applies theories of microeconomics and operations research to decision behavior and mechanism design in market organizations with asymmetric information structures. Topics: game theory, economics of information, and nonlinear pricing. Applications: priority pricing of congested services, emission trading of pollutants, design of competitive markets for electric power, competitive product pricing, etc. Prerequisite: basic knowledge of microeconomics, optimization, probability theory, and decision theory. Recommended: familiarity with mathematical modeling and skills in computer programming.

3 units, Aut (Chao)

347. Capital Investment and Financing Decisions—Optimal capital investment and financing decisions for firms operating in a dynamic and uncertain environment. Forecasting and valuing project cash flows. Designing and managing projects to create and capitalize on operating options and follow-on investment opportunities. Financing alternatives and the relationship between investment type and optimal financial structure. Prerequisites: basic finance theory (equivalent of 242 or Industrial Engineering 235.)

3-4 units, Spr (Johnson)

348. Hedging and Investing with Derivatives—Design, evaluation, and implementation of hedging and investment strategies using derivatives. Practical, problem-motivated techniques for a wide range of application areas. Emphasis is on exchange traded derivatives, private contracts, and business management strategies designed to achieve similar goals when no appropriate exchange traded instruments exist.

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4 units (Sweeney)

442. Investment Projects—Students work in teams to address a practical problem in investment. Faculty assist in identifying appropriate projects and in developing students' understanding of relevant analytical tools. Students assume full responsibility for project analysis and presentation to the decision maker.

4 units (Sweeney)

446. Transportation, Energy, and Environment Research Roundtable (TEERR)—(Formerly EES 455.) Presentations and discussions of research in progress or contemplated, focused on the interplay of transportation, energy, and environmental economics and policy issues. Students must present either their own research or, subject to approval, recent research by others.

1 unit, Aut, Win, Spr (Sweeney)

447. Investment Research Seminar—Presentation and discussion of recent research on investment. Topics vary with the current research interests of seminar participants. Students should be actively involved in research on investment. Enrollment by consent of instructor.

1-3 units, Aut, Win, Spr (Johnson, Luenberger)

DECISIONS

152. Introduction to Decision Analysis—(Formerly EES 31.) How to make good decisions in a complex, dynamic, and uncertain world. People often make decisions that on close examination they regard as wrong. Decision analysis uses a structured conversation based on action theory to obtain clarity of action in a wide variety of domains. Topics: distinctions, possibilities and probabilities, relevance, value of information and experimentation, relevance and decision diagrams, risk attitude. GER: 2b (DR: 6)

3 units, Spr (Shachter)

251. Stochastic Decision Models—(Formerly OR 251.) Efficient formulation and computational solution of sequential decision problems under uncertainty. Markov decision chains and computational programming. Maximum expected present value and rate of return. Optimality of simple policies: myopic, linear, index, acceptance limit and (S,S). Optimal stationary and periodic infinite-horizon policies. Applications to investment, options, overbooking, inventory, production, purchasing, selling, qual-
to organize the decision conversation, the role of the decision analysis cycle and the model sequence, decision making: decision engineering. Topics: how to think about decisions to the considerations necessary for aiding other people and organizations in decision making: decision engineering. Topics: how to organize the decision conversation, the role of the decision analysis cycle and the model sequence, assessing the quality of decisions, framing decisions, the decision hierarchy, strategy tables for alternative development, creating decision diagrams that are spare and effective, understanding and overcoming biases in assessment, developing and using evocative and assessed knowledge maps, dealing with “uncertainty about probability.” Interpretation of various forms of sensitivity analysis, use of approximations, value of revelation, value of joint information, options, flexibility, bidding, assessing and using corporate risk attitude, risk sharing and scaling, and treating decisions involving health and safety. See 353 for continuation of 352. Prerequisite: 252.

3 units, Win (Howard)

353. Decision Analysis III—(Formerly EES 231C.) Extension of decision analysis beyond the basic paradigm. Emphasis on determining and extending the boundaries of systematic analysis of decisions. Topics: concept of decision composite; probabilistic insurance and other challenges to the normative approach; relationship of decision analysis to classical inference and data analysis procedures; the likelihood principle and exchangeability principles; inference, decision, and experimentation using conjugate distributions; developing a risk attitude based on general properties; examination of alternative decision-aiding practices like analytic hierarchy and fuzzy approaches. Presentations on current research. Object is to prepare doctoral students for research and to enable all to understand the discipline at the most fundamental levels. Prerequisite: 352.

3 units, Spr (Howard)


3 units, Win (Shachter)

452. Business Decision Analysis—(Formerly EES 236.) Opportunity for students trained in decision analysis (DA) theory to apply knowledge in business practice. Student teams analyze a current decision situation faced by a business decision-maker as a term project. Teams carry out at least one full DA cycle on an actual business decision. Topics include business model development, sensitivity ranges, probabilistic structuring and assessment, and decision model appraisal. A key challenge is communicating with business decision participants not trained in DA. Discussions tailored toward term
project. Decisions analyzed have covered a wide spectrum of decision making arenas: major corporations, high-technology start-up business, family businesses, universities. Taught simultaneously with 453. Prerequisite: 352. No formal business background required.

4 units, Spr (Holtzman)

453. Medical Decision Analysis—(Formerly EES 235.) Opportunity for students trained in decision analysis (DA) theory to apply knowledge in medical practice. Students analyze current clinical decision situations as a term project. Teams carry out at least one full DA cycle pass on each of two similar decisions. Topics: influence diagram development, preference function development, sensitivity analysis, probabilistic structuring and assessment, and decision model appraisal, the decision-making role of patients and their physicians, medical preference models, practicing decision analysis in a medical context, medical ethics, and the design and use of automation to support medical decisions. Discussions are tailored toward term projects. Decisions analyzed have covered clinical arenas: pediatrics, cancer, obstetrics and gynecology, emergency medicine, psychiatry, nephrology. Taught simultaneously with 452. Prerequisite: 352.

4 units, Spr (Holtzman)

454. Decision Analysis Seminar—(Formerly EES 431.) Discussion of current research in decision analysis and related topics presented by doctoral students and invited speakers.

1 unit, Aut, Win, Spr (Howard)

455. Intelligent Decision Systems—(Formerly EES 234.) Extension of decision analysis beyond individual decisions to classes of decisions that share a common structure. Decision class analysis methodology is used as the foundation for designing automated decision analysis systems. Lectures, class examples, and a term project. Topics: decision class analysis, taxonomy of ignorance, influence diagrams, knowledge maps, preference models, precondition-action rules, formal decision methods, storyboarding. Other topics depending on student interests and project focus. Projects have addressed such decision classes as: personal investment, automated on-board decision-making for planetary exploration, medicine, manufacturing. Prerequisite: 352. Recommended: 452/453 (may be taken concurrently).

4 units, Spr (Holtzman)

457. Topics in Mathematical Programming—
(Formerly OR 371.) A fundamental problem of the decision sciences is finding an "optimal" solution when some of the parameters of a planning or design problem (e.g., coefficients and right-hand sides of a linear program) are not known with certainty. Such problems, when converted to deterministic equivalent, were too large to solve in practice. Seminar discusses recent breakthroughs that now make it possible to solve on personal computers important classes of stochastic programs using decomposition and importance sampling.

3 units, Win, Spr (Dantzig, Infanger)

OPERATIONS

273. Stochastic Models in Operations Research—(Formerly OR 252.) Formulation and analysis of models in operations research involving stochastic processes. Topics: Markovian queues, queues with embedded Markovian chains, general single server queue, queueing networks, diffusion approximations, queues in heavy traffic. Prerequisites: 222, 251, or equivalents.

3 units, Spr (Bambos)


3 units, Win (Bambos)

373. Queueing Systems Modeling and Analysis—
(Formerly OR 358.) Advanced stochastic modeling and analysis of systems involving queueing delays. Markovian queues. Stability analysis of the G/G/1 queue. Key results on single and multi-server queues. Approximation methods. Queueing networks. Introduction to controlled queueing systems. Applications to performance modeling, analysis, and evaluation of communication networks, computer systems, flexible manufacturing systems, software systems, etc. Prerequisite: 222 or equivalent.

3 units (Bambos)

alternate years, not given 1998-99

374. Queueing Systems Design and Control—Advanced efficient control and high-performance design of queueing systems involving job scheduling and resource (server) allocation. Dynamic and stochastic scheduling. Resource allocation in random environments. Real-time scheduling algorithms. Efficient control of queueing networks (routing, admission, flow control, etc.) Performance evaluation of complex queueing structures; identification of performance bottlenecks and techniques for alleviating them. General principles and methodology of high-performance design. Case studies and applications to the design of communication networks, high-speed switching, computer systems, flexible manufacturing systems, service systems, parallel and distributed processing networks, etc. Prerequisites: 373 or equivalent.

3 units (Bambos)

alternate years, given 1998-99

375. Inventories and Networks—
(Formerly OR 356.) Form and computation of solutions of structured nonlinear network and dynamic programs.
lems of conflict resolution and negotiation from an interdisciplinary perspective. Presentations by faculty and by scholars from other universities.

3 units (Veinott) alternate years, given 1998-1999


4 units, Spr (Tse)

STRATEGY

284. Building Core Competence in Corporations—(Formerly EES 288.) Focuses on dynamic development of corporate skills, knowledge, and infrastructure to compete in a changing global competitive environment due to rapid technology advancement, global economic development, changes in consumer's preference and government regulations. Uses model analysis and case study to develop a methodology in building corporate core competence in response to dynamic competitive requirements. Links between EES&OR core and the notion of core competence as a basis for entrepreneurial activities in new business creation and strategy development.

3 units, Spr (Tse)

483. Strategy and Planning Models—(Formerly EES 283.) Design and application of formal models in the study of strategic planning problems. Problems involving issues of technology development, resource management, and uncertainty in a corporate setting. Emphasis is on integrated utilization of modeling tools drawn from diverse methodologies and the requirements for successful application in a policy-making or corporate strategy context. Links between art, theory, and practice are emphasized. Prerequisites: 211, 241, and 252 or equivalent. Recommended: some background in finance and marketing.

4 units, Spr (Weyant)

489. Interdisciplinary Seminar on Conflict Resolution—(Formerly OR 366.) (Same as Economics 386, Law 611, Psychology 283.) Addresses problems of conflict resolution and negotiation from an interdisciplinary perspective. Presentations by faculty and by scholars from other universities.

1-2 units, Win (Arrow, Ross, Wilson, Alexander)

POLICY

193. The Role of Technology in National Security—(Formerly EES 170.) (Graduate students register for 293.) Examines critical decisions made by the U.S. in selected security and space programs, emphasizing current issues. Case studies illustrate the process by which technical, political, and economic issues are brought into the policy process; particularly, the way in which technical organizations in government, government committees, and science advisory boards interact to bring advice to senior policy makers. Examination of some case decisions in other countries.

3 units, Aut (May)

194. The Role of Technology in Policy Decisions—(Formerly EES 171.) (Graduate students register for 294.) Same objectives as 193, with case studies primarily from recent and current energy and environmental policy decisions, e.g., air quality standards, development of future energy technologies, and management of environmental hazards. Case studies illustrate the process of integrating technical information with economic and political considerations, with emphasis on differing roles and points of view among government experts, scientific advisory boards, and interested/affected parties among the public.

3 units, Spr (North, May)

195. International Security in a Changing World—(Same as Political Science 138.) Surveys the major international and regional security problems in the modern world. Interdisciplinary faculty lecture on the political and technical issues involved in arms control, the military legacy of the Cold War, regional security conflicts, proliferation of advanced weapons capabilities, ethnic conflicts, and peacekeeping efforts. (WIM)

5 units, Win (Blacker, Perry, May, Sagan)

196. Transportation Systems and Urban Development—Introduction to transportation systems and planning, and their roles in society. Analytical tools introduced at a conceptual level examine issues and evaluate alternatives. Policy implications and system effectiveness analysis of transportation in an urban context. Topics: economic analysis of transportation, supply and demand equilibrium analysis, urban transportation networks, congestion management, short term and long term transportation planning, impact of technology on transportation systems, land use and transportation, case studies and analysis of current transportation news items. Prerequisite: Math. 21.

3 units, Win (Chiu)
293. The Role of Technology in National Security—(Formerly EES 270; same as 193.)
3 units, Aut (May)

294. The Role of Technology in Policy Decisions—(Formerly EES 271; same as 194.)
3 units, Spr (North, May)

295. Public Policy Analysis—(Formerly EES 214.)
Law and economics as a conceptual framework for policy formulation and evaluation. Examples of policies expressed in the form of property rights; contract, tort, criminal, and antitrust law; and public utility regulation. Analysis of the economic effects of laws and regulations. Recommended: 241.
3 units, Win (Dunn)

297. Progress in Worldwide Telecommunications—(Formerly EES 272.)
Interdisciplinary study of topics in current worldwide developments and economic trends with the participation of prominent guest speakers from international, regional, national and corporate organizations and agencies. Topics: telecommunications services, technology, standardization, (de)regulation, market-driven competition, and the needs of the underserved parts of the world. Individual or team case study and a verbal presentation. May be repeated for credit.
3 units, Sum (Ivanek, Chiu)

299. Voluntary Social Systems—(Formerly EES 287.)
Exploration of ethical theory, feasibility, and desirability of a social order in which coercion by individuals and government is minimized and people pursue ends on a voluntary basis. Topics: efficacy and ethics; use rights for property; contracts and torts; spontaneous order and free markets; crime and punishment; guardian-ward theory for incompetency; the state and interventionism, hypothesis of reverse results; applications help for needy, victimless crimes, and environmental protection; transition strategies to a voluntary society.
1-3 units, Win (Howard)

493. Government Decision Making in Technical Areas—(Formerly EES 470.)
Seminar for graduate students with an interest in government decision making in areas which involve a technological component, e.g., defense, energy, and environment, and high-technology trade and policy. Follows 193 or 194.
1-2 units, Aut, Spr (May)

495. Quantitative Analysis of Public Policy Decisions—(Formerly EES 275.)
Current public policy problems are addressed as a single project team. Team completes the major phases of analysis during the quarter: framing, modeling, data gathering, evaluation, and communication. Instructor coaches the team and provides instruction on gaps in the team's knowledge. Past topics: environmental, health, technology, and transportation issues. Class size limited. Prerequisites: 201A, 212A, 231A, 241A equivalent, or consent of instructors.
3 units, Spr (Borison)

INDUSTRIAL ENGINEERING AND ENGINEERING MANAGEMENT

Emeriti: (Professors) Robert V. Oakford, Henry E. Riggs, David A. Thompson
Chair: M. Elisabeth Paté-Cornell
Deputy Chair: Hau L. Lee
Assistant Professor: Ulrich W. Thonemann
Professor (Teaching): Robert McGinn
Affiliated Faculty: David Beach (Mechanical Engineering), Peter W. Glynn (Engineering-Economic Systems and Operations Research), J. Michael Harrison (Business), Charles A. Holloway (Business), Kosuke Ishii (Mechanical Engineering), James G. March (Business), David B. Montgomery (Business), Evan L. Porteus (Business), Krishna Saraswat (Electrical Engineering)
Consulting Associate Professors: Thomas H. Byers, Thomas Kosnick, Michael G. Lyons
Consulting Assistant Professors: Benham Tabrizi, Adel Turki
Visiting Professor: Gideon Kunde
Visiting Associate Professor: Sultan Bhimjee
Visiting Assistant Professor: Laura R. Kopczak

The Department of Industrial Engineering and Engineering Management (IEEM) focuses on the understanding, operation, and design of industrial and technological systems involved in the production of goods and services. Activities include the management of resources, the design of processes, and the coordination of the people, organizations, and technology necessary to produce and distribute goods and services. Depending on the degree level, students are prepared to design, manage, perform research on, or teach about productive systems that may be in private industry; in federal, state, or local government; or in public, quasi-public, or nonprofit institutions.

Engineering management is concerned with the knowledge and processes required to manage technologically-based enterprises.

UNDERGRADUATE PROGRAM

BACHELOR OF SCIENCE

The program leading to the B.S. degree in Industrial Engineering (IE) is stated earlier under the "School of Engineering" section of this bulletin. This curriculum is planned to serve those
students whose long-run objective is the planning, designing, and implementing of complex economic and technological management systems where a scientific and engineering background is necessary or desirable. The fundamentals of engineering are stressed. The Industrial Engineering program is designed to introduce the student to measurement and control theory, organization theory and behavior, management, economic analysis and modeling, facilities planning and design, and computers and information systems. The objective is to provide the student with systems concepts, an introduction to the role and function of management, methods of analysis, and the human and economic factors that bridge the gap between pure engineering design and pure management. To achieve the objective, the student will take several courses in which a group project represents an important part of the course. In these projects, the student has the opportunity to formulate and solve problems and implement solutions for firms and organizations in the surrounding community.

Many students completing the bachelor’s program pursue graduate study in industrial engineering, in other professional schools (law, medicine, or business) or in fields related to industrial engineering such as economics, statistics, or operations research.

For information about an IE minor, see the “School of Engineering” section of this bulletin.

**GRADUATE PROGRAMS**

IEEM, in collaboration with other departments of the University, offers programs leading to the degrees of Master of Science and Doctor of Philosophy. The department also offers a master’s degree in Manufacturing Systems Engineering in cooperation with the Department of Mechanical Engineering and a dual IEEM/EE master’s degree in cooperation with the Department of Electrical Engineering.

Applicants for admission as graduate students in IEEM must submit the results of the verbal, quantitative, and analytical parts of the Graduate Record Examination. The deadline for application is February 1.

**MASTER OF SCIENCE**

The M.S. degree programs require a minimum of 45 units beyond the equivalent of a B.S. degree at Stanford. All programs represent substantial progress in the major field beyond the bachelor’s degree.

**INDUSTRIAL ENGINEERING AND ENGINEERING MANAGEMENT**

The M.S. program is designed to prepare students for a professional career and to address the critical technical and managerial needs of the companies that are employing graduates. It provides knowledge of production and distribution systems and the process of management as applied to technically-based enterprises, as well as additional skills in the student’s chosen concentration.

Background requirements, taken in addition to degree requirements, include engineering economy, probability, and statistical methods. Industrial Engineering course requirements include:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>133. Industrial Accounting</td>
<td>4</td>
</tr>
<tr>
<td>203. Organizational Behavior</td>
<td>4</td>
</tr>
<tr>
<td>221. Quality and Operations Management</td>
<td>4</td>
</tr>
<tr>
<td>261. Inventory Control and Production Systems</td>
<td>3</td>
</tr>
<tr>
<td>269. Marketing for Technology-Based Companies</td>
<td>4</td>
</tr>
<tr>
<td>270. Strategy in Technology-Based Companies</td>
<td>4</td>
</tr>
</tbody>
</table>

Additional requirements are three courses within a specified concentration and graduate technical and management electives.

Any student admitted to graduate standing on the basis of a bachelor’s degree in a field other than engineering or science must complete the 45 units of work as outlined above, and the equivalent of 45 units of mathematics, science, and engineering breadth. In addition, the student must comply with the prerequisites for the courses listed on the program for the M.S. degree.

The detailed requirements for the M.S. degree are available from the IEEM office.

**ENGINEERING: MANUFACTURING SYSTEMS ENGINEERING**

The M.S. in Engineering with a concentration in Manufacturing Systems Engineering addresses the need for engineers who combine management and design skills focused on manufacturing. There is a critical need for individuals who can deal directly with product design for manufacturability; design of integrated manufacturing systems; financial, organizational, and strategic management issues; and elements of automation technology such as computer-aided design, computer-aided manufacturing, robotics, and microprocessor control.

Manufacturing Systems Engineering is a joint effort of the Departments of Mechanical Engineering, and Industrial Engineering and Engineering Management. The program seeks highly qualified students with strong educational backgrounds in engineering and provides a demanding curriculum strong in both hardware and engineering management. Successful applicants should have a minimum of one year of full-time industrial experience.

The hardware and engineering-design aspects of the program include:

- Ambidextrous Thinking
- Design for Manufacturability
- Integrated Design for Marketability and Manufacturing
- Mechatronic Systems Design
Microprocessor Applications
Robotics and Manipulation

The engineering management subjects include:

- Engineering Economy
- Industrial Accounting
- Inventory Control and Production Systems
- Manufacturing Strategy
- Manufacturing Systems Design
- Organizational Behavior and Management
- Quality Assurance and Control

The hardware and engineering design courses provide hands-on training of these functions and the trade-offs that must be made in selecting alternative systems configurations.

The engineering management subjects provide a suitable perspective so that alternative system choices can be appropriately evaluated for their financial, organizational, and production impacts, as well as their impact on the firm's manufacturing policy.

Beyond the required core, the curriculum allows for elective courses chosen from a broad set of relevant electives providing additional training in engineering management, engineering-design hardware, and aspects of computer science. A student may follow individual interests and tailor the program to meet individual needs.

Students interested in a career focused on manufacturing management and product development may apply for the Dual Manufacturing Systems Engineering and M.B.A. Program. The Dual M.S.E./M.B.A. requires separate applications to each program. Minimum requirements can be met through six to seven quarters of study if the candidate matriculates in both programs simultaneously.

The detailed requirements for the M.S. in Manufacturing Systems Engineering are available from the IEEM office.

INDUSTRIAL ENGINEERING AND ENGINEERING MANAGEMENT (IEEM) AND ELECTRICAL ENGINEERING (EE)

THE DUAL DEGREE PROGRAM

This dual-degree program enables a small, selective set of graduate students to obtain both the IEEM master's degree and the EE master's degree simultaneously. The total number of units required to complete the dual-degree is 72 (versus 90 if the two degrees were pursued separately), and the total number of full-time quarter residency equivalents required to complete the dual-degree is six (students with a 50 percent teaching or research assistantship, who average 9 units per quarter, earn .62 of a full quarter of residence).

The units and time to complete requirements are based on the student having the relevant background such as students with work experience. Most students may need to take some of the background courses.

### Background Requirements (do not count toward degree units)—

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comp. Sci. 106A. Programming Methodology</td>
<td>5</td>
</tr>
<tr>
<td>Stat. 190, Introduction to Statistical Methods (Post Calculus)</td>
<td>5</td>
</tr>
</tbody>
</table>

### Common Foundation Requirements (8 units)—

1. A course on statistical process control and design of experiments at the graduate level. Currently, this can be satisfied by Industrial Engineering (IE) 221 Quality and Operations Management (4 units).
2. A course on basic manufacturing processes as specified by the EE adviser. Currently, this can be satisfied by EE 212 (3 units).
3. EE 205, Entrepreneurial Engineer Seminar or IE 292, Technology Management Seminar (1 unit).

### Electrical Engineering Core Requirements (21 units)—At least 21 units that satisfy the M.S. in Electrical Engineering degree requirements as outlined below:

1. At least three graded EE courses numbered above 200 in one area to provide depth.
2. Three graded EE courses numbered above 200 in an area outside of requirement 1 to provide breadth.
3. Additional units in EE numbered above 200, of which at least 9 are above 300, so that the total of requirements 1, 2, and 3 amounts to at least 21 units.

Part of the 21 units above can be satisfied with up to 3 units of seminars, for example EE 201.

### Industrial Engineering and Engineering Management Core Requirements (21 to 23 units)—

- IE 133. Industrial Accounting .3-4
- IE 203. Organizational Behavior 4
- IE 261. Inventory Control and Production Systems 3
- IE 269. Marketing in Technology-Based Firms 4
- IE 270. Strategy in Technology-Based Firms 4
- One additional 200 level IEEM Course 3-4

### Electives (21 units or more)—

Additional units in EE and IEEM and other departments to meet the total requirement of 72 units.

### ADMISSION OF STUDENTS

For the dual degree, admission to both departments is required, but is coordinated by designated members of both Admissions Committees who make recommendations to the committees of their respective departments.

### STUDENT ADVISING

Every student in the dual degree program has one adviser in EE, and one in IEEM. In addition a committee consisting of designated faculty from both departments serves as a review committee on performance and as an overseeing body of ongoing and graduating students of the program. The committee, consisting of designated members...
of both Admission Committees as described in the previous section, may initially serve as this overseeing body.

DOCTOR OF PHILOSOPHY

The Ph.D. degree is intended for students who desire careers in teaching and research. The program requires a minimum of three years (nine quarters) of full-time graduate study, at least two years of which must be at Stanford. However, the typical student takes four years after entering the doctoral program to complete all Ph.D. requirements. The Ph.D. degree must include a minimum of 90 quarter units of approved course work beyond the bachelor's degree, not including units for dissertation research. Frequently, a Ph.D. applicant has already completed a master's degree and would therefore be required to complete a minimum of 45 additional units. The Ph.D. program is organized along three lines of research: production systems, organizational behavior, and engineering risk analysis. Doctoral students are required to take a number of courses and to pass a qualifying exam in one of these three fields. Detailed requirements for the Ph.D. program are available from the IEEM office.

Responding to the dramatic changes occurring in manufacturing today, the School of Engineering and the Graduate School of Business have created the Future Professors of Manufacturing (FPM) program. This joint program is designed to introduce exceptional professors of manufacturing, who will lead U.S. education and research in manufacturing into the next century. More information on this program can be obtained from the IEEM office or the Stanford Integrated Manufacturing Association (SIMA).

ASSISTANTSHIPS AND FELLOWSHIPS

A limited number of fellowships and assistantships are awarded each year. Written requests to be considered for fellowships and assistantships should be made by February 1.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

UNDERGRADUATE

60. Engineering Economy—(Enroll in Engineering 60.)

100. Organizations: Theory and Management—For undergraduates only, with preference to IEEM majors. Survey of classical and modern organization theory, covering the behavior of the individual, the work group, and the organization.

4 units, Aut (Eisenhardt), Spr (Staff)

116. War and Technology—(Enroll in Science, Technology and Society 116.)


4 units, Win (Kopczak)

125. Manufacturing Systems Design—(Graduate students register for 225.) The concepts and techniques of designing and improving productive systems. Emphasis is on the physical and organizational design of high-performance manufacturing systems. Multidisciplinary approach with the use of digital simulation as a tool for evaluating design alternatives. Prerequisites: 100, 121; Engineering-Economic Systems and Operations Research 121. (WIM)

5 units, Spr (Jucker)

133. Industrial Accounting—Introduction to accounting concepts and operating characteristics of accounting systems. Principles of financial and cost accounting, design of accounting systems, techniques of analysis, and cost control. Designed for the use of accounting information and not as an introduction to a professional accounting career. Interpretation and use of accounting information for decision making is stressed. Non-majors who have taken or are taking elementary accounting should not enroll.

4 units, Aut, Sum (Bhimjee)

155. Assessment of Chronic, Low-Level Environmental Risks—(Enroll in Biological Sciences 155.)

170. Work, Technology, and Society—(Fulfills the School of Engineering's Technology in Society requirement.) Seminar on work in contemporary society as influenced by rapid technological change. Causes and consequences of the current revolution in work and policies for grappling with resultant problems. Focus is on the U.S. with attention to key trends in selected foreign countries. Topics: new technology in the workplace and its bearing on occupational and organizational changes, industrial relations, worker health and safety, economic competitiveness, women workers, workplace ethics, and innovative public and private policies on work. Limited enrollment. GER:3b (DR:9)

4 units, Spr (McGinn)

175. Introduction to Information Systems—Introduction to the design and use of computer-based information systems. Topics: software and hardware used in information systems, information requirements, database design, information system design, organizational aspects of information systems, and applications of information systems in
different industries. Prerequisites: 100; Computer Science 106A, 106B.
4 units, Spr (Thonemann)

180. Senior Project—Restricted to IE majors in their senior year. Students participate in a major project in groups of four. Attention to problem identification and definition, emphasizing data collection, synthesizing feasible solutions to real problems, and presentation of results. Prerequisites: 100, 121, 125, 133, 235, 260; Computer Science 106B or X; Engineering 40, 62; Engineering-Economic Systems and Operations Research 121.
5 units, Win (Staff)

191. Directed Study—Directed study on a subject of mutual interest to student and faculty member. Student must find a faculty sponsor and submit a one-page description of plan.
1 or more units (Staff)

PRIMARILY FOR GRADUATE STUDENTS

3 units, Spr (Adams)

203. Organizational Behavior and Management—Organization theory; concepts and functions of management; behavior of the individual, work group, and organization. Emphasis is on case and related discussion. Enrollment limited to 65 graduate students per section; priority given to IEEM majors.
4 units, Aut, Spr (Staff)

210. Research Seminar on the Software Industry—(Enroll in Computer Science 290.)

214. Good Products and Bad Products—(Same as Mechanical Engineering 214.) Analysis of characteristics of industrial products that can cause them to be successes or failures. These range from the straightforward (performance, economy, reliability) through the complicated (human and cultural fit, compatibility with the environment, craftsmanship, positive emotional response of the user) to the esoteric (elegance, sophistication, symbolism). Engineers and business people must better understand these factors if they are to produce more successful products. Readings, lectures, projects, papers, guest speakers, and field trips. Enrollment limited.
3 units, Win (Adams)

220. Management and Organization of Research and Development—The organization of R&D in industry and the problems of the technical labor force. Relevant theoretical perspectives from sociology, anthropology, and management theory on the social and pragmatic issues that surround technical innovation and the employment of scientists and engineers. Possible topics: organization of scientific and technical communities, industrialization of research, nature of scientific and technical work, strategies for fostering innovation, careers of scientists and engineers, and managerial problems characteristic of R&D settings.
4 units, Spr (Barley)

4 units, Win (Staff)

223. Technology and Work—Theory and research on the social implications of technology and technological change for workers at all levels. Alternate conceptions of technology as social phenomenon. Approaches to the study of technology in the workplace, reactions of individuals and groups to technological change, the construction of a technology's social meaning, and the management of technological change. Emphasis is on automation, electronic data processing, and sophisticated microelectronic technologies, including CAD-CAM systems, telecommunication networks, medical imaging technologies, artificial intelligence, and personal computers.
4 units (Barley) given 1998-99

225. Manufacturing Systems Design—(See 125.) Prerequisite: graduate standing in engineering or consent of instructor.
4 units, Aut (Jucker)

234. Strategic Control Systems—(Enroll in Business 319A.)

4 units, Aut, Win (Turki)

237. International Investment and Financing—Builds on the concepts in 235, e.g., NPV, capital structure, and cost of capital estimation, and extends...
the functions of inventory, determination of order quantities and safety stocks, material requirements planning (MRP), just-in-time systems, master and operations scheduling, supply and hedging, international borrowing and capital structure, and international project evaluation. Practical standpoint; however, an understanding of the theory is a necessity in "real world" applications. Prerequisite: 235.

3-4 units, Spr (Turki)

240. Engineering Risk Analysis—Techniques of analysis of engineering systems for risk management decisions involving trade-offs (technical, human, environmental aspects). Four parts: elements of decision analysis; probabilistic risk analysis (fault trees, event trees, etc.); economic analysis of failure consequences (issues of human safety and long-term economic discounting); and case studies (e.g., space, systems, nuclear power plants, liquefied natural gas terminals, and dams). Emphasis is on risk management issues in the public and private sectors. Prerequisites: Statistics 116, Engineering 60, or equivalents.

3 units, Win (Pate-Cornell)

241. Project Course in Engineering Risk Analysis—Students, individually or in groups, choose, define, formulate, and resolve a real risk management problem, preferably from a local firm or institution. Oral presentation and report required. Scope of the project is adapted to the number of students involved. Three phases: risk assessment, risk communication, and risk management. Emphasis is on the use of probability for the treatment of uncertainties and sensitivity to problem boundaries. Enrollment limited and at discretion of instructor. Prerequisite: 240.

3 units, Spr (Pate-Cornell)

260. Analysis of Production and Operating Systems—Introduction to the design, operation, and control of production systems using mathematical, computational, and modern analytical techniques. Topics: determination of optimal facility location, determination of production lot sizes, optimal timing and sizing of production capacity expansion, and introduction to inventory control. Prerequisites: Engineering 62, Statistics 116.

4 units, Aut (Brandeau)

261. Inventory Control and Production Systems—Topics in the planning and control of manufacturing systems. The functions of inventory, determination of order quantities and safety stocks, alternative inventory replenishment systems, item forecasting, production-inventory systems, materials requirements planning (MRP), just-in-Time systems, master and operations scheduling, supply chain management, and service operations. Enrollment limited. Prerequisite: Statistics 116 or equivalent.

3 units, Win (Hausman)

262. Supply Chain Management—Definition of a supply chain, coordination difficulties, pitfalls and opportunities in supply chain management, inventory-service tradeoffs, performance measurement and incentives. Supply chain network design, global supply chain management, the manufacturing/distribution interface, supplier management. Design and redesign of products and processes for supply chain management, tools for design, industrial applications, strategic alliances. Prerequisites: 260 or 261. Enrollment limited. Prerequisite: 260 or 261.

3 units, Spr (Hausman, Lee)

263. Service Operations Management—Operations management in service industries (e.g., banking, transportation, travel and tourism, health, government) and within service functions of manufacturing (e.g., financing, customer service). Topics: design and delivery of services, the measurement of productivity and quality, managing capacity and demand, quality management, reengineering of service delivery processes, management of technology in services, and managing human resources. Prerequisites: 260 or 261; Engineering 62; Statistics 116.

3 units, Spr (Brandeau)

264. Global Project Coordination—Students engage in projects that are global in nature, and which are related to the planning and design of supply chains and product development. Project teams from Stanford and an overseas institution work on common projects using telephones, faxes, emails, internet, video-conferencing, face-to-face meetings, etc.

3 units, Win (Tabrizi)
Spr (Kopczak)

265. Reengineering the Manufacturing Function—Student teams of four to six redesign the manufacturing and distribution system of a medium-sized manufacturer, focusing on transportation systems, inventory policies for a regional warehouse, design of a national distribution system, operational improvements of work flow, layout of the manufacturing plant and redesign of the planning and control system. Redesign is at an operational level consistent with a strategy of integrating the functions of manufacturing and distribution. Modular approach, with each module requiring analytical or game software. Data is provided. Groups meet twice per module with faculty; written report required. Topics: production planning, inventory theory, linear/integer programming, simulation, economic analysis, and applied probability. Modules are integrated via the focus on the customer; group learning is emphasized. Prerequisite: senior standing.

4 units (Carlson) given 1998-99

268. Manufacturing Strategy—For graduate students only; preference given to Manufacturing Systems Engineering students. Development and im-
implementation of the manufacturing functional strategy. Emphasis is on the integration of manufacturing strategy with the business and corporate strategies of a manufacturing-based firm. Topics: types of manufacturing technologies and their characteristics, quality management, capacity planning and facilities choice, the organization and control of operations, and determining manufacturing's role in corporate strategy. Prerequisite: 261 or 260.

3 units, Spr (Carlson)

269. Marketing for Technology-Based Companies—Priority given to IEEM graduate students. Introduction to marketing strategy and execution for technology-based companies in imagination-intensive industries. Topics: market segmentation and selection, positioning, product management, pricing, channels of distribution, marketing communication. Using case studies based on real companies, students learn to diagnose problems and opportunities, make decisions, analyze customers, competitors, channels, economic and ethical issues that affect their decisions, and reality test their recommended approach. Prerequisites: 133, Engineering 60. Recommended: 235.

4 units, Win (Kosnik)

270. Strategy in Technology-Based Companies—For graduate students; priority given to IEEM. Introduction to basic concepts of strategy, with emphasis on high technology firms. Topics: strategic alliances, standards setting, vertical integration, internationalization, strategic choice, generic and hypercompetitive approaches, and organizational capabilities (e.g., product development and multi-product innovation). Enrollment limited.

4 units, Aut (Eisenhardt)

273. Technology Entrepreneurship—For graduate students interested in starting a technology venture, joining a small firm intent upon rapid growth, or pursuing a career in consulting, venture capital, or the management of a technology business for larger companies. Lectures, cases, and guest speakers from Silicon Valley. Student teams write and present a business plan. All functional areas of high potential start-ups are covered. Enrollment limited. Recommended: 133 or equivalent.

4 units, Aut, Spr (Byers, Lyons)

275. Organizations and Information Systems—For graduate students interested in how information systems impact organizations and how organizations take control of information technology (IT) to gain a competitive edge. Topics: IT strategy, the fit between IT and corporate culture, IT architectural alternatives, changing technologies and organizational learning, the effect of IT on competition, and outsourcing as an offensive strategy. Student teams perform field studies based on situations in which information technology is creating a significant management problem or business opportunity. Case based. Enrollment limited, consent instructor. Prerequisite: 100 or 203.

4 units, Spr (Tabrizi)

279. Technology, Policy, and Management in Newly-Industrializing Countries—(Same as Science, Technology and Society 279.) Technology is seen as the key to development and prosperity in most parts of the world. Building technological capability in newly-industrializing countries at the national and firm level. What makes technology special, government intervention that affects technology, the concept of technology leader and technology follower environments, the transfer of technology from "leader" countries, indigenous technological capability, human capital, culture and innovation, the role of small firms and new enterprises in technological capability. Managing innovation in firms: how innovation is different in technology-followers, organizing for shop-floor innovation, building an innovation culture, the special role of R&D in followers, the role of design, technology strategy for followers. Cases from Korea, India, Brazil, Singapore and other NICs.

2-4 units, Aut (Forbes) starts October 6

281. Workshop on Technology and Management in Newly-Industrializing Countries—(Same as Science, Technology and Society 280.) Reviews current work in the field, building on issues covered in IE/STS 279. Weekly readings and discussion. Prerequisite: 279.

2-3 units, Win (Forbes)

291. Directed Study—Directed study on a subject of mutual interest to student and faculty member. Prerequisite: find a faculty sponsor.

1 or more units (Staff)


1 unit, Aut, Win, Spr (Byers, Kosnik)


Aut, Win, Spr (Staff)


Aut, Win, Spr (Staff)

320. Doctoral Research Seminar in Organizations—Enrollment limited to Ph.D. students. Topics from current published literature and working papers. Content varies. Prerequisite: consent of instructor.

3 units, Aut (Eisenhardt)
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321. Doctoral Research Seminar in Work, Technology, and Organization—Enrollment limited to Ph.D. students. Topics from current published literature and working papers. Content varies. Prerequisite: consent of instructor.
3 units, Aut, Win (Barley)

322. Organizations as Social Networks—Social structures can be investigated as social networks. Organizational and inter-organizational structures may be analyzed as patterned relationships among individuals, groups, and other organizations. Such networks appear as predictors of a variety of social dynamics (attitude similarity, the diffusion of innovation, turnover, and the allocation of organizational resources). Methods for collecting and analyzing network data include graph theory, sociometry, clique detection, centrality analysis, blockmodeling, and the quadratic assignment procedure. Readings of recent published research, actual data sets, and relevant computer programs. Prerequisites: one or more courses in organizational behavior, sociology, psychology, anthropology, or political science. Recommended: course in statistics or research methods.
3 units (Barley) not given 1997-98

323. Doctoral Seminar on Ethnographic Research—Designed for graduate students; upper-level undergraduates with consent of instructor. Ethnosemantic interviewing and participant observation is emphasized. Techniques for taking, managing, and analyzing fieldnotes and other qualitative data. 15 hours per week outside of class collecting and analyzing own data. Methods texts and ethnographies offer examples of how to analyze and communicate ethnographic data. Prerequisite: consent of instructor.
8 units (Barley) given 1998-99

326. Strategy and Organization Doctoral Research Seminar—Review of current research at the interface between strategy/business policy and organization theory. Topics: top management teams and strategic decision making processes; strategic boundary issues (e.g., strategic alliances, vertical integration, and diversification); reward structure and board relationships; evolution of strategies, technology, and populations of organizations. Enrollment limited and at the discretion of instructor. Prerequisite: Sociology 260 or equivalent.
4 units (Eisenhardt) not given 1997-98

340. Doctoral Seminar in Risk Analysis—Limited to doctoral students. Doctoral study including reading/review of the literature in the fields of engineering risk assessment and risk management. New methods and topics, emphasizing probabilistic methods and decision analysis. Applications to risk management problems involving technical, economic, and organizational aspects of engineering system safety. Possible topics: treatment of uncertainties, learning from near misses, and use of expert opinions.
3 units, Spr (Paté-Cornell)

3 units (Carlson) given 1998-99

3 units (Brandeau) alternate years, given 1998-99

364. Single and Multi-Location Inventory Models—Theoretical treatment of the management and control problems of inventory systems in production and distribution with models for single and multi-location systems. Emphasis is on operating characteristics, performance measures, and optimal operating and control policies. Prerequisite: Statistics 217 or equivalent.
3 units, Spr (Hausman)

365. Applications of Multi-Echelon Inventory Theory—For doctoral students with some background in inventory theory. Seminar. Readings in recent literature dealing with the application of multi-echelon inventory theory to industrial problems. Some theory; focus is on applications issues and opportunities.
3 units (Hausman) alternate years, given 1998-99

366. Planning Models for Manufacturing Systems—Theoretical treatment of optimization models for manufacturing system design and control, focusing primarily on deterministic models. Topics: resource allocation problems, scheduling and sequencing problems, models of flexible manufacturing systems, manufacturing cell design, and queuing network models of manufacturing systems. Prerequisites: 260 or equivalent, Engineering 62 or equivalent.
3 units, Win (Brandeau)

367. Advances in Integrated Supply Chain Management—The integration and coordination of material, information, and financial flows in a supply chain that spans suppliers, manufacturers, distributors, logistics providers, and customers. Recent advances prepare students for research. Topics:
information distortion, postponement, centralized vs decentralized control, vendor managed inventory, logistic restructuring, incentive issues, manufacturer and retailer interface, replenishment coordination, and value of information.

3 units, Spr (Lee)

390. IEEM Doctoral Research Seminar—Presentations of current research papers by speakers from inside and outside the department. Ph.D. students must attend during every quarter in residence. No letter grades or units given.

Aut, Win, Spr (Staff)

MATERIALS SCIENCE AND ENGINEERING

Chair: John C. Bravman
Associate Chair: Bruce M. Clemens
Associate Professor: Bruce M. Clemens
Assistant Professors: Reinhold H. Dauskarid, Paul C. McIntyre, Charles B. Musgrave, Shan X. Wang
Professor (Research): Robert S. Feigelson
Consulting Professors: Frank W. Grossman, Paul A. Flinn, Timur Halicioglu, Michael A. Kelly, Thomas Marieb, David Redfield, Arden Sher, John Stringer, Jeffrey Wadsworth

The Department of Materials Science and Engineering is concerned with the relation between the structure and properties of materials, factors that control the internal structure of solids, and processes for altering the structure and properties of solids. It brings together in a unified discipline the developments in physical metallurgy, ceramics, and the physics and chemistry of solids. The undergraduate program, described under the “School of Engineering” section of this bulletin, provides training for the materials engineer and also preparatory training for graduate work in materials science. Capable students are encouraged to take at least one year of graduate study to extend their course work. Coterms0001 nal degree programs are encouraged both for undergraduate majors in Materials Science and Engineering and for undergraduate majors in related disciplines. Graduate programs lead to the degrees of Master of Science, Engineer, and Doctor of Philosophy.

FACILITIES

The department is based in the Thomas F. Peterson Engineering Laboratory (Building 550). Offices for the chair and most of the faculty, for the administrative and technical staff, and for most graduate students are located there, as are a number of lecture and seminar rooms. Facilities for teaching and research are also available within the Peterson Lab, including equipment for electrical measurements; mechanical testing of bulk and thin film materials; fracture and fatigue of advanced materials; metallography; optical, scanning, transmission electron microscopy and atomic force microscopy; UHV sputter deposition; vacuum annealing treatments; wet chemistry; and x-ray diffraction. The Peterson Lab is also the home for the Center for Research on Information Storage Materials (CRISM) with corresponding facilities for magnetic measurements. The Rapid Prototyping Laboratory (RPL), housing material deposition and removal stations, is a joint facility with Mechanical Engineering, and is housed next to the Peterson Labs in Building 530. The department maintains two microcomputer clusters for its students, one with a number of Macintosh computers, and the other with five HP and DEC workstations. Both clusters are linked with the world wide Internet network.

Depending on the needs of their program, students and faculty also conduct research in a number of other departments and independent laboratories. Chief among these are the Center for Integrated Systems (CIS), the Center for Materials Research (CMR), and the Stanford Synchrotron Radiation Laboratory (SSRL).

The Center for Integrated Systems (CIS) is a laboratory joining government and industrially funded research on microelectronic materials, devices, and systems. It houses a 10,000 square foot, class 100 clean room for Si and GaAs integrated circuit fabrication; a large number of electronic test, materials analysis, and computer facilities; and office space for faculty, staff, and students. In addition, CIS provides start-up research funds and maintains a “Fellow-Mentor” program with industry.

For information on CMR and SSRL, see the “Center for Materials Research” and “Stanford Synchrotron Radiation Laboratory” sections of this bulletin.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

The undergraduate program provides training in solid state fundamentals and in physical metallurgy. Students desiring to specialize in this field
during their undergraduate period may do so by following the curriculum outlined in the “School of Engineering” section of this bulletin as well as the School of Engineering Undergraduate Hand- book. The University’s basic requirements for the bachelor’s degree are discussed in the “Undergraduate Degrees” section of this bulletin. Electives are available so that students with broad interests can combine materials science and engineering with work in another science or engineering de-

For information about an MSE minor, see the “School of Engineering” section of this bulletin.

COTERMINAL
B.S./M.S. PROGRAM

Stanford undergraduates who wish to continue their studies for the Master of Science degree in the coterminal program should apply for entrance after the beginning of the eighth quarter of undergraduate work and before the end of the eleventh quarter. The application must give evidence that the student possesses the potential for strong academic performance at the graduate level. Each application is evaluated by the department’s Admissions Committee. Scores from the Graduate Record Exam (GRE) General Test must be reported before action can be taken on an application. Materials science is a highly integrated and inter-disciplinary subject, and so applications from students of any engineering or science undergraduate major are encouraged. Information forms pertaining to the coterminal program may be obtained from the department’s Student Services Manager or from the Degree Progress Section of the Registrar’s Office, Old Union. Students entering the coterminal program and receiving both their B.S. and M.S. degree in Materials Science and Engineering should also see the “Master of Science for MS&E Coterminal Students” section below.

GRADUATE PROGRAMS

Graduate students can specialize in any of the areas of materials science and engineering. In collaboration with other departments of the University, additional special programs are available.

MASTER OF SCIENCE

The University’s basic requirements for the M.S. degree are discussed in the “Graduate Degrees” section of this bulletin. The following are specific departmental requirements.

The Department of Materials Science and Engineering (MSE) requires a minimum of 45 units for a master’s degree. Up to 9 units of work done as a graduate student at another institution may sometimes be transferred to give unit credit toward the electives used in acquiring a Stanford degree. Substitution of courses taken for specif-
ic Stanford courses is approved on the Master’s Program Proposal. Master’s Program Proposal forms should be filled out, signed by the students’ academic adviser, and submitted to the department Student Services Manager by the end of the first week of the students’ second quarter of study. (Generally, this means by the end of the first week of Winter Quarter.) Final changes to the master’s program must be submitted no later than one academic quarter prior to degree conferral.

Degree requirements (for students entering after September 1, 1996) are as follows:

1. A minimum of 33 units of MSE course work, including cross-listed courses, taken for a letter grade. The following are limitations:
   a) A maximum of 9 units of cross-listed courses may be used in fulfilling this requirement.
   b) One unit seminars and research units cannot be used to fulfill this requirement.

2. Lab courses MSE 171, 172, 173 (which count toward the required 33 units of MSE course work).

   Note: students who have had equivalent lab courses at other universities, equivalent practical experience, or have a materials related degree or background are expected to file a petition with the department’s Student Services Manager to have this requirement waived.

3. Six courses selected from MSE 152, 251, and 201 through 209. These ‘core’ courses count towards the required 33 units of MSE course work, however:
   a) MSE 152 is not an option for students with materials science undergraduate degrees.
   b) MSE 251 may not be used to fulfill this “core” requirement if the student has a materials science undergraduate degree, although it may be applied towards the required 33 units of MSE course work.

4. Approved course electives to bring total units to 45. Of the 12 units of elective courses:
   a) Nine of the 12 units must be taken for a letter grade.
   b) A maximum of 3 units may be seminars.
   c) If writing a Master’s Research Report, a minimum of 6 and a maximum of 9 units of MSE Research units may be used.
   d) A maximum of 3 units may be undergraduate units (offered at Stanford University).
   e) A maximum of 5 units may be used for a foreign language course (not including any remedial English courses).
   f) The combination of seminar units, undergraduate units, and language units may not exceed 6 units total.
   g) The combination of research units, seminar units, undergraduate units, and language units may not exceed 12 units total. (Re-

MATERIALS SCIENCE AND ENGINEERING 245
search units are only allowed when writing a Master’s Research Report.)

5. A minimum grade point average (GPA) of 2.75 for course work at Stanford.

All proposed degree programs are subject to approval by the department’s Academic Degree Committee which has responsibility for assuring that each proposal is a technically coherent program.

PETITION PROCESS FOR TRANSFER FROM M.S. TO PH.D. DEGREE PROGRAM

When a student is admitted to the graduate program, he or she is admitted specifically into either the M.S. or the Ph.D. program. Admission to the Ph.D. program is required for the student to be eligible to work towards the Ph.D. degree. A student in the M.S. program can petition to be admitted to the Ph.D. program by filing an “M.S. to Ph.D. Transfer Petition.”

This petition must be accompanied by a one-page statement of purpose stating the reasons why the student wishes to transfer to the Ph.D. program, and two letters of recommendation from members of the Stanford faculty, including one from the student’s prospective adviser and at least one from an MSE faculty member belonging to the Academic Council.

The “M.S. to Ph.D. Transfer Petition” is due to the department Student Services Manager by the end of the second week of Spring Quarter during the student’s first year in the M.S. program. Only students enrolled in the 200 series core-course sequence are eligible to petition, and an GPA of 3.25 or better in the first two quarters of the core-course sequence is required.

Transferring to the Ph.D. program is a competitive process and only fully qualified M.S. students are admitted. The Admissions Committee and the department chair consider the student’s original application to the graduate program as well as the material provided with the transfer petition. Decisions regarding these petitions are normally available by the fourth week of Spring Quarter.

MASTER’S RESEARCH REPORT

Students wishing to take this option must submit a program of study, including not more than 9 and no less than 6 units of MSE research units, to the department for approval at least two quarters before the degree is granted. The total combined units of MSE research units, seminars, language courses, and undergraduate courses cannot exceed 12. If a master’s research report is not to be submitted, units of MSE 200 cannot be applied to the department’s requirement of 45 units for the master’s degree.

The report must be approved by two faculty members. One faculty member is the student’s research adviser. The other faculty member is assigned by the department. Three copies of the report (one copy for each approving faculty member and the department library), in final form and signed by two faculty members, must be in the hands of the department’s Student Services Manager one week prior to the beginning of the final examination period of the final quarter of the program. The report is not an “official” University thesis but rather is intended to demonstrate to the department faculty an ability to conduct and report directed research. The Master’s Report is not appropriate for students wishing to petition for the Ph.D. program. Refer to the Materials Science and Engineering Student Handbook for more information and further clarification concerning this report.

M.S. FOR MSE COTERMINAL STUDENTS

The University’s basic requirements for the M.S. degree are discussed in the “Graduate Degrees” section of this bulletin. The following are specific departmental requirements.

The Department of Materials Science and Engineering (MSE) requires a minimum of 45 units for a master’s degree. Students who have received or are currently working towards a B.S. degree in Materials Science and Engineering from Stanford and are pursuing a M.S. in Materials Science and Engineering should follow the requirements below in lieu of those stated in the “Master of Science” section listed above. Master’s Program Proposal forms should be filled out, signed by the students’ academic adviser, and submitted to the department’s Student Services Manager by the end of the first week of the students’ second quarter of study. (Generally, this means by the end of the first week of Winter Quarter.) Final changes to the master’s program must be submitted no later than one academic quarter prior to degree conferral.

Degree requirements (for students entering after September 1, 1996) are as follows:

1. A minimum of 21 units of MSE course work taken for a letter grade. Crosslisted courses, 1-unit seminars, research units and/or MSE 400 cannot be used to fulfill this requirement. These 21 units of MSE courses must include:
   a) The three remaining core classes (MSE 191/201-199/209) not taken for the B.S. degree in MSE.
   b) Twelve units of non-crosslisted MSE 300 level courses (not including 300).
2. Approved course electives to bring total units to 45. Of the 24 units of elective courses:
   a) Twenty-one of the 24 units must be taken for a letter grade.
   b) A maximum of 3 units may be seminars.
   c) If writing a Master’s Research Report, a minimum of 6 and a maximum of 9 units of M.S. research units (MSE 200) may be used.

d) A maximum of 6 units may be undergraduate units.
e) A maximum of 5 units may be used for a foreign language course (not including any remedial English courses).
f) The combination of seminar units, undergraduate units, and language units may not exceed 9 units total.
g) The combination of research units*, seminar units, undergraduate units, and language units may not exceed 15 units total.
3. A minimum grade point average (GPA) of 2.75 for course work at Stanford.

* Research units are only allowed when writing a Master’s Research Report.

See the Master’s Research Report section listed previously, noting the additional unit privileges allotted to cotermlinal students. See the department’s Student Services Manager for more information and/or clarification on what constitutes an approved course.

ENGINEER

The University’s basic requirements for the degree of Engineer are outlined in the “Graduate Degrees” section of this bulletin.

A student wishing to enter the Engineer program must have completed the substantial equivalent requirements of the M.S. in Materials Science and Engineering, and must file with the department’s Student Services Manager a petition requesting admission to the program as well as stating the type of research to be done and the professor who will be supervising. Once approved, the Application for Candidacy must be submitted to the department’s Student Services Manager by the end of the second quarter in the Engineer program. Final changes in the Application for Candidacy form must be submitted no later than one academic quarter prior to degree conferral.

A program should include 9 units of graduate non-crosslisted courses in materials science (exclusive of research units, seminars, colloquia, MSE 400—Participation in Teaching, and so on) beyond the requirements for the M.S. degree, and additional research or other units to meet the 36-unit University minimum requirement. A grade point average (GPA) average point of 3.0 must be maintained for all course work taken at Stanford.

Completion of an acceptable thesis is required. The Engineer thesis must be approved by two Academic Council faculty members, one of whom must be a member of the department, and submitted in triplicate. A petition is required for non-Academic Council members.

DOCTOR OF PHILOSOPHY

The University’s basic requirements for the Ph.D. degree are outlined in the “Graduate Degrees” section of this bulletin.

Degree requirements (for students entering after September 1, 1996) are as follows:
1. Complete the requirements for the M.S. in Materials Science and Engineering (MSE) unless transferring in a master’s degree from elsewhere.
2. Pass a departmental oral qualifying examination the second year after admission. A GPA of 3.25 from the nine core classes (201-209) is required for admission to the Ph.D. qualifying exam. Students whose GPA is between 3.00 and 3.25 may petition for possible admission to the exam. Students who have passed the departmental oral examination are required to complete the Application for Candidacy for the Ph.D. degree by the end of the quarter in which they pass the exam. Final changes in the Application for Candidacy form must be submitted no later than one academic quarter prior to degree conferral.
3. Submit a program consisting of at least 72 units, which contains a minimum of 12 technical non-crosslisted MSE course units beyond the minimum requirement of MSE courses for the M.S. degree (exclusive of research units, seminars, colloquia, MSE 400—Participation in Teaching, and so on). These MSE courses must be taken for a letter grade. The program for your M.S. and Ph.D. combined must include the following:
   a) MSE 201 through 209 (27 units), except for students who have had equivalent courses at other universities and have successfully petitioned out.
   b) A minimum of 12 units of 300-level courses from the MSE faculty (not including MSE 300).
   c) A minimum of 12 units of courses taken from one of the following lists of Advanced Specialty Courses (see below). Some and/or all of these courses can be the same as the courses used to meet requirement ‘3b’ above; however, the units may not be counted twice.
4. Maintain a GPA of 3.0 for all course work taken as a graduate student at Stanford.
5. Present the result of the dissertation at a department seminar immediately preceding the University Oral examination.

† If transferring in a master’s degree from another university, your program must still meet the criteria listed in items 3a, b, c, above. Transfer units may be applied towards ‘a’ and ‘c,’ but not ‘b.’ The maximum you may transfer in is 36 units. All transfer courses must meet the same criteria as those given at Stanford.
ADVANCED SPECIALTY COURSES

Materials Characterization: Elect. Engr. 329, 331; MSB 320, 321, 322, 323, 325


PRIMARILY FOR UNDERGRADUATES

50. Introductory Science of Materials—(Enroll in Engineering 50.)
4 units, Win (Bravman)
Spr (Sinclair)

100. Undergraduate Independent Study—Independent study in materials science under supervision of a faculty member.
1-3 units, any quarter (Staff)

150. Undergraduate Research—Participation in a research project.
3-6 units, any quarter (Staff)

151. Microstructure and Mechanical Properties—For undergraduates; see 251. Prerequisite: Engineering 50 or equivalent.
3 units, Aut (Dauskardt)

3 units, Spr (McIntyre)

159Q. Stanford Introductory Seminar: Research in Japanese Companies— Preference to sophomores. The home-campus equivalent of the course taught at Kyoto. Knowledge from this research and company visits is evaluated in a seminar/discussion setting. Lecture/discussion on the structure of a Japanese company from the point-of-view of Japanese society. Visiting researchers from Japanese companies, with brief presentations and extensive question and answer periods, explore the Japanese research ethic.
3 units, Spr (Sinclair)

3 units, Aut (Vinci)

2 units, Win (Staff)

163. Materials Science Lab III—For undergraduates. Lab on experimental techniques for the study of the mechanical properties of materials, including fracture toughness testing of metallic materials, ductile-to-brittle transition curves, fracture of ceramics using indentation techniques, and effects of grain size on yielding and strain hardening. Prerequisites: 198/208, 151/251, or equivalent.
2 units, Spr (Nix)

170. Materials Selection in Design—For undergraduates; see 270. Prerequisites: Engineering 14 and 50 or Mechanical Engineering 111.
3 units, Win (Prinz)

171. Materials Science Lab I—For graduates; see 251. Prerequisite: Engineering 50 or equivalent.
2 units, Aut (Vinci)

172. Materials Science Lab II—For graduates; see 162. Prerequisite: 193/203.
2 units, Win (Staff)

173. Materials Science Lab III—For graduates; see 163. Prerequisites: 198/208, 151/251, or equivalent.
2 units, Spr (Nix)

179Q. Stanford Introductory Seminar: Materials in Sports—Preference to sophomores. Introduction to materials science using sporting equipment as a vehicle to highlight material properties, performance, and selection criteria. The classes of material, and the properties relevant to sporting equipment performance. Examples from modern sporting equipment (golf clubs, tennis rackets, skis, and bicycles) highlight the relationship between material properties and product performance.
3 units, Spr (Clemens)
191. Mathematical and Computational Methods in Materials Science—For undergraduates; see 201. Prerequisite: familiarity with ordinary differential equations.
4 units, Aut (Barnett)

192. Solid State Thermodynamics—For undergraduates; see 202. Prerequisite: physical chemistry or introductory thermodynamics.
4 units, Aut (Musgrave)

193. Atomic Arrangements in Solids—For undergraduates; see 203.
4 units, Aut (Sinclair)

194. Phase Equilibria—For undergraduates; see 204. Prerequisite: 192/202.
4 units, Win (Vinci)

195. Waves and Diffraction in Solids—For undergraduates; see 205. Prerequisite: 193/203 or consent of instructor.
4 units, Win (Clemens)

196. Imperfections in Crystalline Solids—For undergraduates; see 206. Prerequisite: 193/203.
4 units, Win (Nix)

197. Rate Processes in Materials—For undergraduates; see 207. Prerequisites: 191/201, 192/202, 194/204.
4 units, Spr (Clemens)

198. Mechanical Properties of Materials—For undergraduates; see 208. Prerequisites: 193/203, 196/206.
4 units, Spr (Dauskardt)

199. Electrical and Magnetic Properties of Solids—For undergraduates; see 209. Prerequisite: 195/205 or equivalent.
4 units, Spr (Wang)

PRIMARILY FOR GRADUATES

200. Master’s Research—Participation in a research project.
1-15 units, any quarter (Staff)

3 units, Aut (Barnett)

3 units, Aut (Musgrave)

203. Atomic Arrangements in Solids—Description of atomic arrangements in perfect and imperfect crystalline solids, defect chemistry, elements of formal crystallography including development of point groups and space groups.
3 units, Aut (Sinclair)

3 units, Win (Vinci)

205. Waves and Diffraction in Solids—Elementary principals of x-ray, vibrational, and electron waves in solids. Basic wave behavior including Fourier analysis, interference, diffraction, and polarization. Examples of wave systems, including electromagnetic waves from Maxwell’s equations. Diffracted intensity in reciprocal space and experimental techniques such as electron and x-ray diffraction. Lattice vibrations in solids, including vibrational modes, dispersion relationship, density of states and thermal properties. Free electron model. Basic quantum mechanics and statistical mechanics including Fermi-Dirac and Bose-Einstein statistics. Prerequisite: 193/203 or consent of instructor.
3 units, Win (Clemens)

3 units, Win (Nix)

3 units, Spr (Clemens)

208. Mechanical Properties of Materials—Introduction to the mechanical behavior of solids emphasizing relationships between microstructure and mechanical properties. Elastic, anelastic, and plastic properties of materials. The relations between stress, strain, strain rate, and temperature for plastically deformable solids. Application of dislo-
209. Electrical and Magnetic Properties of Solids—Introduction to the electronic, magnetic, optical, and ferroelectric properties of solids. Emphasis is on concepts and models of phonons and electronic energy bands and applied to metals, semiconductors, magnetic materials, and insulators. Elementary quantum and statistical mechanics concepts are utilized. Prerequisite: 195/205 or equivalent.
3 units, Spr (Dauskardt)

220. Master's Research Project—Participation in a Master's Research Project.
1-15 units, any quarter (Staff)

230. Materials Science Colloquium—(Can be repeated for credit.) (AU)
1 unit, Aut (Barnett, Bravman)
Win (Sinclair, Wang)
Spr (Mclntyre, Nix)

251. Microstructure and Mechanical Properties—Primarily for students without a materials background. Mechanical properties and their dependence on microstructure in a range of engineering materials. Elementary deformation and fracture concepts, strengthening and toughening strategies in metals and ceramics. Topics: dislocation theory, mechanisms of hardening and toughening, fracture, fatigue, and high-temperature creep. Prerequisite: Engineering 50 or equivalent.
3 units, Aut (Dauskardt)

3 units, Win (Prinz)

299. Practical Training—Provides educational opportunities in high-technology research and development labs in industry. Qualified graduate students engage in internship work and integrate that work into their academic program. Following internship work students complete a research report outlining their work activity, problems investigated, key results, and any follow-on projects they expect to perform. Meets the requirements for Curricular Practical Training for students on F-1 visas. Student is responsible for arranging own employment. See department Student Services Manager before enrolling. Can be repeated for credit.
1 unit, any quarter (Staff)

300. Ph.D. Research—Participation in a research project.
1-15 units, any quarter (Staff)

310. Integrated Circuit Fabrication Processes—(Enroll in Electrical Engineering 212.)
3 units, Aut (Plummert)

312. New Methods in Thin Film Synthesis—Techniques to grow thin films on an atomic scale provide the materials base for new classes of coatings and devices. Fundamentals of vacuum growth techniques, molecular beam epitaxy (MBE), chemical vapor deposition (CVD), ion beam assisted deposition, and plasma processes. Relationships between deposition parameters and film properties. Industrial applications of thin film synthesis.
3 units, Aut (Clemens)
alternate years, not given 1998-99

313. Principles of Ceramics Processing—Fundamental description of the unit process operations used to fabricate polycrystalline ceramic components. Topics: grain growth, solid state and liquid phase sintering, drying, ceramic forming processes, beneficiation, introductory rheology, particle packing, size/shape effects, influence of processing additives, powder synthesis through solid state reactions and wet chemical methods. Prerequisites: 204 and 207, or their equivalents.
3 units, Aut (Mclntyre)

315. Polymer Physics—(Enroll in Chemical Engineering 233.)
3 units, Spr (Frank)

317. Advanced Integrated Circuit Fabrication Processes—(Enroll in Electrical Engineering 311.)
3 units, Spr (Saraswat)

318. Integrated Circuit Fabrication Laboratory—(Enroll in Electrical Engineering 410.)
3-4 units, Win (Saraswat)

319. Electron and Ion Beams for Semiconductor Processing—(Enroll in Electrical Engineering 217.)
3 units (McCord)
alternate years, given 1998-99

3 units, Win (Sinclair)
alternate years, not given 1998-99

321. Transmission Electron Microscopy—Image formation and interpretation. The contrast phenomena associated with perfect and imperfect crystals
from a physical point of view and from a formal treatment of electron diffraction theory. The importance of electron diffraction to systematic analysis and recent imaging developments. Prerequisite: 193/203, 195/205, or equivalent.

3 units (Sinclair)
alternate years, given 1998-99

322. Transmission Electron Microscopy Laboratory—Experimental application of electron microscopy to typical problems in materials science, including specimen preparation, microscope operation and alignment, recording and analysis of bright and dark field images and diffraction patterns, dislocation and stacking fault characterization, analytical and high resolution techniques. Prerequisites: 321, consent of instructor.

3 units, Spr (Marshall)

323. Thin Film and Interface Microanalysis—The science and technology of a variety of microanalytical techniques, including Auger electron spectroscopy (AES), Rutherford backscattering spectroscopy (RBS), secondary ion mass spectroscopy (SIMS), ion scattering spectroscopy (ISS), and x-ray photoelectron spectroscopy (XPS or ESCA). Generic processes such as sputtering and high-vacuum generation. Prerequisite: some prior exposure to atomic and electronic structure of solids.

3 units, Spr (Bravman)
alternate years, not given 1998-99

325. X-Ray Diffraction—Diffraction theory and its relationship to structural determination in solids. Focuses on applications of x-rays; concepts can be applied to neutron and electron diffraction. Topics: Fourier analysis, kinematic theory, Patterson functions, diffraction from layered and amorphous materials, single crystal diffraction, dynamic theory, defect determination, surface diffraction, techniques for data analysis, and determination of particle size and strain. Prerequisites: 193/203, 195/205.

3 units (Clemens)
alternate years, given 1998-99

332. Photoelectronic and Photovoltaic Materials and Devices—Phenomena involving the interaction between light and electrons in semiconductors. Photoconductivity, recombination, defect analysis, grain boundary effects, amorphous semiconductors, photovoltaic effects and current photovoltaic research, and photoeffects in quantum wells and superlattices. Prerequisite: 209 or equivalent.

3 units (Bube) alternate years, given 1998-99

334. Basic Physics for Solid State Electronics—(Enroll in Electrical Engineering 228.)

3 units, Aut (J. Harris)

335. Properties of Semiconductor Materials—(Enroll in Electrical Engineering 327.)

3 units, Win (J. Harris)

336. Physics of Advanced Semiconductor Devices—(Enroll in Electrical Engineering 328.)

3 units, Spr (J. Harris)

341. Principles and Models of Semiconductor Devices—(Enroll in Electrical Engineering 216.)

3 units, Aut (Saraswat)

342. The Electronic Structure of Surfaces and Interfaces—(Enroll in Electrical Engineering 329.)

3 units, alternate years, given 1998-99

343. The Science of Semiconductor Interfaces—(Enroll in Electrical Engineering 331.)

3 units, alternate years, given 1998-99

344. Solid-State Sensors and Actuators—(Enroll in Electrical Engineering 312.)

3 units, Win (Kovaes)

345. Advanced VLSI Devices—(Enroll in Electrical Engineering 316.)

3 units, Win (Wong)


3 units, Spr (White)

348. Principles of Magnetic Recording—Fundamental understanding and applications of magnetic recording. Read and write processes, inductive and MR and GMR heads, thin film and particular media, medium and head noise, head-media interface. Technology trends and recording system issues introduced. Prerequisites: 347 or equivalent or consent of instructor.

3 units, Aut (Wang)

349. Introduction to Information Storage Systems—(Enroll in Electrical Engineering 335.)

3 units, Win (Wang)

350. Micromechanics—Use of the theory of elasticity to discuss the fields of dislocations, inclusions, inhomogeneities, and their interactions in deformable solids. Applications to the microscopic foundations of macroscopic plasticity, the effects of strain energy on morphologies associated with phase transformations, and the determination of "effective" properties of composite media. Prerequisite: any brief introduction to the theory of elasticity, or consent of instructor.

3 units (Barnett) not given 1997-98

351. Microstructural Design of Advanced Materials and Composites—Strategies for the control of mechanical properties through microstructural design in a range of engineering materials and their
composites. Emphasis is on a fracture mechanics description of strengthening and toughening methods in advanced ceramics and various composites. Structural reliability of brittle materials systems and their relationship to microstructure and processing in terms of fracture statistics, and long term properties in terms of subcritical crack-growth processes with examples and applications, including cyclic fatigue and high-temperature creep of metals and ceramics. Prerequisites: basic understanding of materials microstructure, mechanical properties and fracture mechanics; 251 and 358, or equivalents.

3 units (Dauskardt) not given 1997-98

352. Stress Analysis of Thin Films and Layered Composite Media—Introduction to methods of stress analysis of layered dissimilar media, including thin films deposited on substrates, composite laminates, and stratified anisotropic elastic materials based on techniques pioneered by Stroh. Stress states generated by thermal and elastic mismatch and local stress concentrations at interfacial cracks or corners with applications to integrated circuit devices, aircraft materials, and geophysical media. Prerequisites: introductory course in strength of materials or the theory of elasticity, some familiarity with matrix algebra.

3 units (Barnett) alternate years, given 1998-99


3 units, Aut (Nix) alternate years, not given 1998-97

354A. Introduction to Fracture Mechanics—(Enroll in Mechanical Engineering 240A.)

3 units, Aut (Gao)

354B. Advanced Fracture Mechanics—(Enroll in Mechanical Engineering 240B.)

3 units, Win (Gao)

355. Time-Dependent Plasticity—Theories and mechanisms of creep. Temperature and strain rate effects on plastic flow of solids. Relation of high temperature strength and ductility of materials to structure. Prerequisite: 198/208.

3 units (Nix) alternate years, given 1998-99

356. Fatigue Design and Analysis—(Enroll in Mechanical Engineering 245.)

3 units, Win (Nelson)


3 units, Win (Dauskardt)

359. Crystalline Anisotropy—Introductory matrix and tensor analysis with applications to the effects of crystal symmetry on elastic deformation, thermal expansion, diffusion, piezoelectricity, magnetostriction, and thermodynamics, following a treatment at the level of Nye's text. Homework sets use Mathematica™.

3 units, Spr (Barnett)

360. Techniques of Failure Analysis—(Enroll in Aeronautics and Astronautics 252.)

2 units, Spr (Ross)

361. Mechanics of Composites—(Enroll in Aeronautics and Astronautics 256.)

3 units, Win (Springer)

400. Participation in Materials Science Teaching—Can be repeated for credit.

1-3 units, Aut, Win, Spr (Staff)

405. Seminar in Applications of Transmission Electron Microscopy—Can be repeated for credit. (AU)

1 unit, Aut, Win (Sinclair)
Division Chairs: Craig T. Bowman (Thermosciences), Dennis R. Carter (Biomechanical Engineering), Thomas Hughes (Mechanics and Computation), Parviz Moin (Flow Physics and Computation), (The Design Division operates without a chair.)

Laboratory Directors: David W. Beach (Program Director, Manufacturing Systems Engineering and Product Realization Laboratory), J. Edward Carryer (Smart Product Design Laboratory), Mark Cutkosky (Manufacturing Sciences Lab and Manufacturing Models Laboratory), John K. Eaton (Heat Transfer and Turbulence Mechanics), Larry J. Leifer (Center for Design Research), Reginald E. Mitchell (High Temperature Gasdynamics), Parviz Moin (Center for Turbulence Research), Friedrich B. Prinz (Rapid Prototyping Laboratory)


Associate Professors: Mark A. Cappelli, Rolf A. Faste, Huajian Gao, Kosuke Ishii, David M. Kelley, Sanjiva Lele, Reginald E. Mitchell, M. Godfrey Mungal, Sheri D. Sheppard, Andrew M. Stuart

Assistant Professors: Christopher Edwards, Kenneth E. Goodson, Jean H. Heegaard, Thomas W. Kenny

Professors (Research): Paul Durbin, Felix E. Zajac

Professor (Teaching): David W. Beach

Courtesy Professors: George S. Springer, Robert L. Street

Courtesy Associate Professors: Mark Denny, Oussama Khatib

Lecturers: Bryan Cooperrider, Tishya Leong-Wren, Robert Stancel, Francisco Valero-Cuevas

Consulting Professors: Victor Scheinman, Robert L. Taylor,

Consulting Associate Professor: Gary S. Beaupre

Consulting Assistant Professors: Brendan Boyle, Dennis Boyle, William Burnett, Sara L. Turnbull

Acting Assistant Professors: John R. Fessler, Vincent K. Jones, Sunil Puria, Charles Taylor

Visiting Professors: Javier Jimenez, Barry M. Katz

Acting Instructor: Mark Martin

The programs in the Department of Mechanical Engineering (ME) are designed to provide background for a wide variety of careers. The discipline is very broad, but is generally understood to emphasize an appropriate mix of energy science and technology, applied mechanics, design computer simulations, and biomechanical engineering. Graduates at all degree levels have traditionally entered into energy industries, transportation, product manufacturing industries, government laboratories and agencies dealing with these problems, and a variety of academic positions.

Since mechanical engineering is a broad discipline, the undergraduate program can be a springboard for graduate study in business, law, medicine, political science, and other professions where a good understanding of technology is often important. Both undergraduate and graduate programs provide excellent technical background for work in biomechanical engineering, environmental pollution control, ocean engineering, transportation, and on other multidisciplinary problems that concern our society. Throughout the various programs, considerable emphasis is placed on developing systematic procedures for analysis, effective communication of one’s work and ideas, practical and aesthetic aspects in design, and responsible use of technology. This can provide a student with an approach and a philosophy of great utility, irrespective of an ultimate career.

The department has five divisions: Mechanics and Computation, Design, Biomechanical Engineering, Thermosciences, and the Flow Physics and Computation Division that operates jointly with the Department of Aeronautics and Astronautics. Each maintains its own labs, shops, and offices.

The Biomechanical Engineering (BME) Division has teaching and research activities which focus primarily on musculoskeletal biomechanics and rehabilitation engineering. Research in other areas including blood flow, hearing, vision, ocean, and plant biomechanics exist in collaboration with associated faculty in medicine, biology, and engineering. The Biomechanical Engineering Division has particularly strong research interactions with the Mechanics and Computation Division, the Design Division, and the Department of Functional Restoration in the School of Medicine.

The Design Division emphasizes cognitive skill development for creative R&D in design process and is specifically concerned with automatic control, computer-aided design, design aesthetics, design research, experimental stress analysis, fatigue and fracture mechanics, finite element analysis, human factors, kinematics, manufacturing systems, microcomputers in design, optimization, and robotics. The Design Division offers undergraduate and graduate programs in Product Design (jointly with the Department of Art). The division offers a master’s program in Manufacturing Systems Engineering jointly with the Department of Industrial Engineering and Engineer-
ing Management, and the Graduate School of Business.

The Flow Physics and Computation Division (FPC) is a joint laboratory between the departments of Aeronautics and Astronautics and Mechanical Engineering. Flow Physics and Computation blends research on flow physics and modeling with algorithm development, scientific computing, and numerical database construction and applications to systems involving flows. The division has recently established new programs in numerical simulation of combustion and plasma processing. The FPC faculty teach graduate and undergraduate courses in engineering computational mathematics, fluid mechanics, thermodynamics and propulsion, acoustics, aerodynamics, and computational fluid mechanics.

The Mechanics and Computational Division covers biomechanics, continuum mechanics, dynamics, experimental and computational mechanics, finite element analysis, fluid dynamics, fracture mechanics, micromechanics, and simulation-based design. Qualified students can work as research project assistants, engaging in thesis research in working association with the faculty director and fellow students. Projects include analysis, synthesis, and control of systems; biomechanics; flow dynamics of liquids and gases, including geophysical and astrophysical applications; fracture and micro-mechanics, vibrations, and nonlinear dynamics; and original theoretical, computational, and experimental investigations in the strength and deformability of elastic and inelastic elements of machines and structures.

The Thermosciences Division offers courses and specialized work in applied thermodynamics, combustion, energy systems, fluid mechanics, gas physics and chemistry, heat transfer, laser diagnostics, materials processing, and plasma sciences.

**FACILITIES**

The department divisions maintain modern laboratories that support undergraduate and graduate instruction and graduate research work.

The Structures and Composites Laboratory, a joint activity with the Department of Aeronautics and Astronautics, studies structures made of fiber-reinforced composite materials. Equipment for fabricating structural elements include autoclave, filament winder, and presses. X-ray, ultrasound, and an electron microscope are available for nondestructive testing. The lab also has environmental chambers, a high-speed impactor, and mechanical testers. Lab projects include designing composite structures, developing novel manufacturing processes, and evaluating environmental effects on composites.

Experimental facilities are available through the interdepartmental Structures and Solid Mechanics Research Laboratory, which includes a electrohydraulic materials testing system, a vehicle crash simulator, a shake table for earthquake engineering and related studies, together with highly sophisticated auxiliary instrumentation. Facilities to study micromechanics of fracture area available in the Micromechanics/Fracture Laboratory include a computer-controlled materials testing system, a long distance microscope, an atomic force microscope, and other instrumentation. Additional facilities for evaluation of materials are available through the Center for Materials Research, Center for Integrated Circuits, and the Ginzton Laboratory. Laboratories for biological experimentation are available through the School of Medicine. Individual accommodation is provided for the work of each research student.

The Mechanics and Computation Division has a Computational Mechanics Laboratory. Its facilities include Sun, Silicon Graphics, and HP workstations running UNIX, Apple Macintosh Personal Computers, and laser printers. Software in the laboratory includes a variety of public domain packages and some major commercial packages for engineering analysis.

The Design Division has facilities for lab work in experimental mechanics and experimental stress analysis. Additional facilities, including MTS electrohydraulic materials test systems, are available in the Solid Mechanics Research Laboratory.

The division also maintains the Product Realization Laboratory, which includes machine tools, CAD/CAM, foundry, plastics facility, welding, and wood. The shops offer tools and coaching to support prototype fabrication as an intrinsic part of the design process. The MB 210 Design Project Laboratory has facilities for CAD, assembly, and testing of original designs by master’s students in the engineering design program. A Smart Product Design Laboratory supports microprocessor application projects. The Center for Design Research (CDR) has an excellent facility for concurrent engineering research, development, and engineering curriculum creation and assessment. Resources include a network of high-performance workstations. For World Wide Web mediated concurrent engineering by virtual, non-colocated, design-development teams, visit the CDR URL (http://cdr.stanford.edu) for details. In addition, CDR has several industrial robots for student projects and research. These and several NC machines are part of the CAD Manufacturing Sciences Lab. The Manufacturing Modeling Laboratory (MML) addresses various models and methods that lead to competitive manufacturing. The Design Division also has a unique “Product Design Loft,” in which students in the Product Design program develop graduate design projects. The Rapid Prototyping Laboratory consists of seven processing stations including CNC milling, plasma deposition, laser deposition, low temperature
deposition, shot peening, grit blasting, and cleaning. Students gain experience by using ACIS and Pro Engineer on Hewlett Packard workstations for process software development.

Many Biomechanical Engineering Division activities and resources are associated with the Rehabilitation Research and Development Center of the Veterans Administration Palo Alto Health Care System. This major national research center has computational and prototyping facilities. In addition, the Rehabilitation Research and Development Center houses the Experimental Mechanics Laboratory, Skeletal Biomechanics Laboratory, Human Motor Control Laboratory, Electrophysiology Laboratory, and Rehabilitation Device Design Laboratory. These facilities support graduate course work as well as Ph.D. student research activities.

Computational and experimental work is also conducted in various facilities throughout the School of Engineering and the School of Medicine, particularly the Advanced Biomaterials Testing Laboratory of the Department of Material Science and Engineering, the Orthopaedic Research Laboratory in the Department of Functional Restoration, and the Vascular Research Laboratory in the Department of Surgery. In collaboration with the School of Medicine, biologically and clinically oriented work is conducted in various facilities throughout the Stanford Medical Center and the Veterans Administration Palo Alto Health Care System.

The Thermosciences Division has two major labs. The Heat Transfer and Turbulence Mechanics (HTTM) Laboratory concentrates on fundamental research aimed at understanding and improved prediction of turbulent flows and thermosciences at the microscales. The High Temperature Gas-Dynamics Laboratory (HTGL) is engaged in research activities in combustion of pollutant formation, laser-based diagnostics, plasma sciences, and reactive and nonreactive gas dynamics. The experimental capability of the HTGL includes a central laboratory computer with dedicated minicomputers, diagnostic devices for combustion gases, a spray combustion facility and plasmas, laboratory combustors including a coal combustion facility and supersonic combustion facilities, several advanced laser systems, a variety of plasma facilities, and five shock tubes and tunnels. The Thermosciences and Design Division share the Microscale Thermal and Mechanical Characterization laboratory (MTMC). MTMC is dedicated to the measurement of thermal and mechanical properties in thin-film systems, including microfabricated sensors and actuators and integrated circuits. MTMC features a nanosecond scanning laser thermometry facility, a laser interferometer, a near-field optical microscope, and an atomic force microscope. The activities at MTMC are closely linked to those at the Heat Transfer Teaching Laboratory (HTTL), where undergraduate and master’s students use high-resolution probe stations to study thermal phenomena in integrated circuits and thermally-actuated microvalves. HTTL also provides macroscopic experiments in convection and radiative exchange.

The Flow Physics and Computation Division has a parallel super-computer, advanced workstation, color display and reproduction facilities. It has direct advanced access to the major national computing facilities of the nearby NASA-Ames Research Center which includes CRAY-C90s and massively parallel super computers. The Center for Turbulence Research, CTR, a research consortium between Stanford and NASA, is affiliated with this group. The intellectual atmosphere of Flow Physics Computation Division is greatly enhanced from interactions with CTR’s large staff of postdoctoral researchers and distinguished visiting scientists.

Guidance and Control Laboratory, a joint activity with the Department of Aeronautics and Astronautics and the Department of Mechanical Engineering specializes in construction of electromechanical systems and instrumentation, particularly where high precision is a factor. Work ranges from robotics for manufacturing to feedback control of fuel injection systems for automotive emission control. The faculty and staff work in close cooperation with both the Design and Thermosciences Divisions on device development projects of mutual interest.

Many computation facilities are available to department students. Three of the department’s labs are equipped with super-minicomputers. Numerous smaller minicomputers and microcomputers are used in the research and teaching laboratories.

Library facilities at Stanford are outstanding. In addition to the general library, there are Engineering, Mathematics, Physics, and other department libraries of which engineering students make frequent use.

UNDERGRADUATE PROGRAMS
BACHELOR OF SCIENCE

Specializing in mechanical engineering (ME) during the undergraduate period may be done by following the curriculum outlined earlier under the “School of Engineering” section of this bulletin. The University’s basic requirements for the bachelor’s degree are discussed in the “Undergraduate Degrees” section of this bulletin.

A Product Design program is offered by the Design Division and leads to the B.S. degree in Engineering. It is recommended, however, that this should not be considered a terminal degree and that students who elect this program continue on through the master’s degree in this field. Cours-
The basic University requirements for the M.S. degree are discussed in the "Graduate Degrees" section of this bulletin.

Mechanical engineering is a varied profession, ranging from primarily aesthetic aspects of design to highly technical scientific research. Disciplines of interest to mechanical engineers include biomechanics, energy conversion, fluid mechanics, materials, nuclear reactor engineering, propulsion, rigid and elastic body mechanics, systems engineering, scientific computing, and thermodynamics, to name a few. No mechanical engineer is expected to have a mastery of the entire spectrum.

Master's degree programs are offered in Mechanical Engineering (M.S.M.E.), Engineering (Manufacturing Systems Engineering) (M.S.E.: M.S.E.), Engineering (Biomechanical Engineering) (M.S.E.: B.M.E.), Engineering (Product Design) (M.S.E.: P.D.), Engineering (M.S.E.).

The following sections list specific requirements for the master’s degrees listed above.

**MASTER OF SCIENCE**

The master’s program normally consists of three quarters of full-time course work. No thesis is required, although many students become involved in research projects during the master’s year, particularly to explore their interests in working for the Ph.D. degree. Students whose undergraduate backgrounds are entirely devoid of some of the major subject disciplines of engineering (for example, applied mechanics, applied thermodynamics, fluid mechanics, ordinary differential equations) may need to take some undergraduate courses to fill in obvious gaps and prepare themselves to take graduate courses in these areas. Such students may require more than three quarters to fulfill the master’s degree requirements, as the make-up courses may not be used for other than the unrestricted electives (see item ‘4’ below) in the M.S. degree program. However, it is not the policy to require fulfillment of mechanical engineering B.S. degree requirements in order to obtain an M.S. degree; furthermore, students who have already fulfilled certain categories of the M.S. degree requirements as a result of undergraduate work may find they have sufficient time (see item ‘3’ below) to obtain the M.S. degree in the normal three quarters.

**MECHANICAL ENGINEERING**

The master’s degree program requires 45 units of course work taken as a graduate student. At least 36 of the units must be taken at Stanford; any units transferred from other universities (up to 9 are allowed) must be in graduate-level courses taken while registered as a graduate student and may not be applied toward fulfillment of item ‘2’ below. No thesis is required. However, students who desire some research experience during the mas-
4. Unrestricted Electives (to bring the total number of units submitted for the M.S. degree to 45): students are encouraged to use these units outside of engineering, mathematics, or the sciences. Students should consult their advisers on course loads and on ways to use the unrestricted electives to make a manageable program.

5. Within the courses satisfying the requirements above, there must be at least one graduate-level course dealing with lab studies. The course could be ME 210B, C, 217B, 218A, 226B, 225A, 248, 249, 254, 267, 282A, 282B, 319. ME 292 satisfies the requirement if 3 units are involved in lab experiments. Students who have had substantial lab experience in an industrial or government research institute may be exempted from the requirement by the ME Student Services office.

Candidates for the M.S. in Mechanical Engineering are expected to have the approval of the faculty, and a minimum grade point average (GPA) of 2.75 in the 45 units presented in fulfillment of degree requirements. All courses used to fulfill requirements 1, 2, 3, and 5 above must be graded (excluding seminars and courses for which a Satisfactory/No Credit grade is given to all students).

Students falling below a GPA of 2.5 at the end of 20 units may be disqualified from further registration. Students failing to meet the complete degree requirements at the end of 60 units of graduate registration are disqualified from further registration. Courses used to fulfill deficiencies arising from inadequate undergraduate preparation for mechanical engineering graduate work may not be applied to the 60 units required for graduate registration.

PRODUCT DESIGN

The graduate program leading to an M.S. in Engineering (Product Design) is unique in that it is jointly offered by the departments of Mechanical Engineering and Art. Students with undergraduate engineering degrees other than Stanford's B.S. in Product Design spend an additional year taking prerequisite undergraduate and product design courses. The requirements for this degree are:

**Course No. and Subject** | **Units**
--- | ---
Art 360A,B,C. Master's Project* | 6
ME 211A,B,C. Master's Project* | 12
ME 221. Human Factors | 3
ME 313. Ambidextrous Thinking | 3
Approved Electives | 15
Free Electives | 6
Total | 45

* Taken jointly each quarter.

† Students are expected to create a plan of graduate studies suited to their personal needs. The courses listed below are recommended electives and may require enrollment approval by the instructor.

Biomedical Design
ME 280. Biomechanical Engineering Seminar
ME 282A,B. Special Projects in Biomechanical Engineering

Design Management
Indust. Engr. 133. Industrial Accounting
Indust. Engr. 269. Industrial Marketing
Indust. Engr. 271. New Enterprise Management
Indust. Engr. 272. Managing Small Technical Companies
Design Philosophy

ME 215. The Designer in Society

Engineering Design

ME 210A, B, C. Experiences in Team-Based Design
ME 222. Kinematic Synthesis of Mechanisms

Visual Design

Art 261. Mechatronic Systems Design
Art 268. Design Synthesis
Art 269. Advanced Creative Studies

Admission requirements and GPA graduation requirements are the same as for the M.S. in Mechanical Engineering described above. Applicants must also submit a portfolio showing evidence of design ability (for example, photos or slides of several art and design projects).

Students with nonengineering undergraduate degrees in design may apply to the Department of Art for a similar graduate design program administered by that department and leading to an A.M. or M.F.A. in Design. Students with nonengineering degrees who wish to earn the M.S. degree should consult with the program adviser.

MANUFACTURING SYSTEMS ENGINEERING

The M.S. in Engineering (Manufacturing Systems Engineering) addresses the need for engineers who combine management and design skills focused on manufacturing. There is a critical need for individuals who can deal directly with product design for manufacturability; design of manufacturing tools; financial, organizational, and strategic management issues; and elements of automation technology such as computer-aided design, computer-aided manufacturing robotics, and microprocessor control.

Manufacturing Systems Engineering (MSE) is offered jointly by two departments: Mechanical Engineering, and Industrial Engineering and Engineering Management. The program seeks high-quality students with strong educational backgrounds in engineering and provides a demanding curriculum strong in both hardware aspects and engineering management.

The hardware and engineering-design aspects of the program include:

ME 210A, B, C. Experiences in Team-Based Design
ME 218A, B, C. Smart Product Design
ME 313. Ambidextrous Thinking
ME 319. Robotics and Vision
ME 315 A, B. Integrated Design in Marketing and Manufacturing

The engineering management subjects include:

Indust. Engr. 121. Statistics and Quality Control
Indust. Engr. 203. Organization Behavior and Management
Indust. Engr. 261. Inventory Control and Production Systems
Indust. Engr. 268. Manufacturing Strategy

Hardware and engineering design courses provide hands-on knowledge of these functions and the trade-offs that must be made to take advantage of the relationships between design and manufacturing.

Engineering management subjects provide a suitable perspective for evaluating alternative financial, organizational, and production systems as well as a firm’s manufacturing policy.

Beyond the required core, the curriculum allows for choice from a broad set of relevant electives to provide additional training in engineering management, engineering design hardware, and aspects of computer science. Here a student may tailor the program to meet individual interests and needs.

Students in the MSE program must have faculty approval and a minimum GPA of 3.0 in the 45 units presented in fulfillment of the degree requirements.

DUAL M.S.E. AND M.B.A. PROGRAM

Students interested in a career focused on manufacturing management and product development may apply for the Dual Manufacturing Systems Engineering and Master of Business Administration Program. Minimum requirements can be met through seven quarters of study if the candidate matriculates to both programs simultaneously. For additional information, contact the ME Student Services office.

BIOMECHANICAL ENGINEERING

Students interested in graduate studies in biomechanical engineering can choose one of the programs below.

1. M.S. in Mechanical Engineering: students who apply and are admitted to the M.S.M.E. program can elect to take biomechanical engineering courses as part of their M.S.M.E. requirements. These courses are usually applied towards the student’s engineering breadth or technical electives.

2. M.S. in Engineering: Biomechanical Engineering (M.S.E.: B.M.E.): this degree program allows students more flexibility in taking courses in the life sciences and generally emphasizes a more interdisciplinary curriculum. Minimum GPA requirements are the same as for the M.S. in Mechanical Engineering.

A Ph.D. in Biomechanical Engineering is not offered. Students from either master’s degree path (Mechanical Engineering or Biomechanical Engineering) receive their Ph.D. degrees in Mechanical Engineering. The Ph.D. qualifying examinations are flexible enough to accommodate students with either master’s degree preparation.

ENGINEERING

As described in the “School of Engineering” section of this bulletin, each department in the school may sponsor students in a more general degree, the M.S. in Engineering. Sponsorship by
by the Department of Mechanical Engineering (ME) requires (1) filing a petition for admission to this program on the day before instruction begins, and (2) that the center of gravity of the proposed program lies in ME; no more than 18 units used for the proposed program can have been previously completed. The program must include at least 9 units of graduate-level work in the department other than ME 200-208 and 290-297. The petition must be accompanied by a statement explaining the program objectives and how it is coherent, contains depth, and fulfills a well-defined career objective. The grade requirements are the same as for the M.S. in Mechanical Engineering.

POST-MASTER'S DEGREE PROGRAMS

The department offers two post-master's degrees: Engineer and Doctor of Philosophy. Postmaster’s research generally requires some evidence that a student has research potential before he or she commits to supervision and a research assistantship. It is most efficient to carry out this preliminary research effort during the M.S. degree year.

In their first post-master's registration, students seeking post-master’s degrees must report their status of faculty supervision to the department.

ENGINEER

The basic University requirements for the degree of Engineer are discussed in the “Graduate Degrees” section of this bulletin.

This degree represents an additional year of study beyond the M.S. degree and includes a research thesis. The program is designed for students who wish to do professional engineering work upon graduation and who want to engage in more specialized study than is afforded by the master's degree alone.

Admission standards are substantially the same as indicated under the master’s degree. However, since thesis supervision is required and the availability of thesis supervisors is limited, admission is not granted until the student has personally engaged a faculty member to supervise a research project. This frequently involves a paid research assistantship awarded by individual faculty members (usually from the funds of sponsored research projects under their direction) and not by the department. Thus, personal arrangement is necessary. Students studying for the M.S. degree at Stanford and desiring to continue to the Engineer degree ordinarily must make such arrangements during the M.S. degree year. Students holding master's degrees from other universities are invited to apply and may be admitted providing they are sufficiently well qualified and have made thesis supervision and financial aid arrangements.

Department requirements for the degree include an acceptable thesis; up to 18 units of credit are allowed for thesis work. In addition to the thesis, 27 units of approved advanced course work in mathematics, science, and engineering are expected beyond the requirements for the M.S. degree; the choice of courses is subject to approval of the adviser. Students who have not fulfilled the Stanford M.S. degree requirements are required to do so (with allowance for approximate equivalence of courses taken elsewhere).

Candidates for the degree must have faculty approval and have a minimum grade point average (GPA) of 3.0 for all courses (exclusive of thesis credit) taken beyond those required for the master's degree.

Product Design—A special two-year program in the field of Product Design leads to the degree of Engineer in Mechanical Engineering. It is intended for students who wish to augment in-depth graduate engineering study with education in the aesthetic and human qualities essential in new product development.

A typical program represents course and thesis content equivalent to the M.S. in Mechanical Engineering plus the M.S. in Engineering (Product Design). Alternatively, a program of interdisciplinary graduate study may be devised according to guidelines described in the “School of Engineering” section of this bulletin (for example, in Biomedical Design, Computer-Based Design, or Man-Machine Systems).

The 90-unit total can be completed in two academic years. Students deficient in prerequisite areas may take more time. Those who fulfill program requirements are awarded the M.S. in Engineering (Product Design) and the degree of Engineer in Mechanical Engineering (Product Design) simultaneously.

Admission follows the same requirements as for the master's degree in Product Design.

DOCTOR OF PHILOSOPHY

The basic University requirements are discussed in the “Graduate Degrees” section of this bulletin. The Ph.D. degree is intended primarily for students who desire a career in research, advanced development, or teaching; for this type of work a broad background in math and the engineering sciences, together with intensive study and research experience in a specialized area, are the necessary requisites.

The department allows a minor field but does not require one. However, if a minor is waived, the candidate must show breadth of training by taking a group of courses in one or more related fields or departments as noted below.

A student studying for the Ph.D. degree ordinarily will not take an Engineer degree, although this is not precluded. However, the student must have a master's degree, and must fulfill in essence the requirements for the Stanford M.S. degree in Mechanical Engineering.
In special situations dictated by compelling academic reasons, Academic Council members who are not members of the department's faculty may serve as the principal dissertation adviser when approved by the department. In such cases, a member of the department faculty must serve as program adviser and member of the reading committee, and agree to accept responsibility that department procedures are followed and standards maintained.

Admission involves much the same consideration described under the Engineer degree. Since thesis supervision is required, admission is not granted until the student has personally engaged a member of the faculty to supervise a research project. Once a student has obtained a research supervisor, this supervisor becomes thereafter the student's academic adviser. Research supervisors may require that the student pass the departmental oral examination before starting research and before receiving a paid research assistantship. Note that research assistantships are awarded by faculty research supervisors and not by the department.

Prior to being formally admitted to candidacy for the Ph.D. degree, the student must demonstrate knowledge of engineering fundamentals by passing a qualifying oral examination. The academic level and subject matter of the examination correspond approximately to the M.S. program described above. The form and timing of the examination differs for the five divisions of the department. Information may be obtained from the division or Student Services office.

Normally, the qualifying examination is taken during the first post-master's year. A student must have the written approval of a tentative dissertation supervisor (sponsor) in order to take the examination. (Sponsorship carries no implication of financial support.) To apply for the examination, a student must have a Stanford graduate grade point average (GPA) equivalent of at least 3.25. Courses used in the GPA evaluation are the same as those that would be used to meet the M.S. GPA requirement. Students entering Stanford with an M.S. from another school must have a Stanford GPA of at least 3.25. Courses used in the GPA evaluation are the same as those that would be used to meet the M.S. GPA requirement. Students entering Stanford with an M.S. from another school must have a 3.25 GPA in that school's M.S. program to take the examination in their first quarter at Stanford. After the first quarter at Stanford, such a student must meet the GPA of 3.25 for courses taken at Stanford.

Ph.D. candidates must complete a minimum of 36 units of approved formal course work (excluding research, directed study, and seminars) in advanced study beyond the M.S. degree. The courses should consist primarily of graduate courses in engineering and sciences, although the candidate's reading committee may approve a limited number of upper-division undergraduate courses and courses outside of engineering and sciences, as long as such courses contribute to a strong and coherent program. In addition to this 36-unit requirement, all Ph.D. candidates must participate each quarter in one of the following (or equivalent) seminars: ME 280, 290, 294, 295, 296, 298; Aeronautics and Astronautics 296 or 297.

The Ph.D. thesis normally represents at least one full year of research work and must be a substantial contribution to knowledge. Students may register for course credit for thesis work (ME 301) to help fulfill University residence requirements, but there is no minimum limit on registered dissertation units. Candidates should note that University residence requirements (see the "Graduate Degrees" section of this bulletin) are expressed in terms of equivalent full-time registration and not in terms of units per se; questions on this should be addressed to the manager of Student Services.

The department has a breadth requirement for the Ph.D. degree. This may be satisfied either by a formal minor in another department or by course work that is approved by the dissertation reading committee.

The final University oral examination is conducted by a committee consisting of a chair from another department and four faculty members of the department or departments with related interests. Usually, the committee includes the candidate's adviser and two faculty members chosen to read and sign the candidate's dissertation. The examination consists of two parts. The first is open to the public and is scheduled as a seminar talk, usually for one of the regular meetings of a seminar series. The second is conducted in private and covers subjects closely related to the dissertation topic.

A student wishing to complete the Ph.D. requirements in four years should ordinarily complete the M.S. by the Spring Quarter of the first year, pass the qualifying examination by the Autumn Quarter of the second year and complete the course work, demonstrate feasibility of research methods, and obtain approval of the dissertation proposal by the end of the third year.

**COMBINED Ph.D./M.D. DEGREE PROGRAM**

Students interested in a career oriented towards biomechanical research and clinical medicine can pursue the combined Ph.D./M.D. degree program. The Ph.D. degree is administered by the Department of Mechanical Engineering of the School of Engineering. To be formally admitted as a Ph.D. degree candidate in this combined degree program, the student must apply through normal department channels and must have earned an M.S. in Mechanical Engineering, an M.S.E in Biomedical Engineering, or a comparable master's degree. Students must pass the Department of Mechanical Engineering Ph.D. qualifying examination and pursue a doctoral thesis in a biomechanical engineering area.
The M.D. degree is administered by the School of Medicine. Students must apply separately through regular channels for admission to the M.D. program and satisfactorily complete 204 units in courses and clerkships approved for credit toward the M.D. degree. Of these, 72 quarter units must be in clerkships. For further information on the M.D. program, consult the School of Medicine Catalog.

For students fulfilling the full M.D. requirements who earned their master's level engineering degree at Stanford, the Department of Mechanical Engineering may waive its normal department requirement that the 36 units applied towards the Ph.D. degree (beyond the master's degree level) be formal course work. Consistent with the University Ph.D. requirements, the department may instead accept 36 units consisting of courses, research, or seminars that are approved by the student's Ph.D. thesis reading committee and the department chair. For further information, consult the manager of Student Services.

Ph.D. MINOR

Students who wish a Ph.D. minor in ME should consult the ME Student Services office. A minor in ME may be obtained by completing 20 units of approved graduate-level ME courses or by completing 9 units of graduate-level courses and passing the departmental qualifying oral examination in two appropriate areas identified by the minor adviser.

Courses approved for the minor must form a coherent program and must be selected from those satisfying requirement '2' for the M.S. in Mechanical Engineering.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

(AU) indicates that the course is subject to the University Activity Unit limitations (8 units maximum).

PRIMARILY FOR UNDERGRADUATES

Note 1—The following are especially suitable for freshmen.

101. Visual Thinking
103. Manufacturing and Design

Note 2—Lab sections in experimental engineering are assigned in groups. If the lab schedule permits, students are allowed, with due regard to priority of application, to arrange their own sections and lab periods. Enrollment with the instructor concerned, on the day before instruction begins or the first day of University instruction, is essential in order that the lab schedule may be prepared. Enrollment later than the first week is not permitted.

10. Introduction to Engineering Analysis—Integrated approach to the fundamental scientific principles that are the cornerstones of engineering analysis: conservation of mass, atomic species, charge, momentum, angular momentum, energy, and production of entropy expressed in the form of balance equations on carefully defined systems, and incorporating simple physical models. Emphasis is on setting up analysis problems arising in engineering. Topics: simple analytical solutions, numerical solutions of linear algebraic and laboratory experiences. Provides foundation and tools for subsequent engineering courses.

3 units, Spr (Reynolds)

30. Engineering Thermodynamics—(Enroll in Engineering 30.)


4 units, Win (Cappelli)
Spr (Mungal)

71. Stanford Introductory Seminar: Combustion—Friend or Foe—Preference to sophomores. Since prehistoric times, combustion has been the primary energy source of human kind. The role that combustion will play as a future energy source and the environmental and economic consequences of this. Issues: projections of energy utilization and energy sources into the future (and the associated uncertainties), the environmental effects of combustion (including air quality and global warming), strategies to reduce environmental effects of combustion, and the role of regulations in driving combustion technology and use of fossil fuels. Structured presentations, open discussion, directed readings. Outside speakers; visit to the campus combustion laboratory. Project with oral/written reports.

3 units, Win (Bowman)

99. Mechanical Dissection—Series of mechanical dissection labs to resolve common questions of everyday products and provide confidence in "hands-on" skills. Students choose a current product, track its history, obtain samples (current and "antique"), disassemble, and explore functions. Formal and informal presentations. Lab. Enrollment limited to 20. Prerequisite: keen sense of curiosity.

3 units, Win (Staff)

100. Differential Equations in Engineering—Origin of differential equations, linear first-order differential equations, linear second-order equations with constant coefficients, variation of param-
etters, finite difference methods for first-order equations, higher order methods, methods for boundary value problems, series solution, singular points, eigenvalue problems, Sturm-Liouville problem, stiffness and curing it. Limited enrollment. Prerequisites: Math. 43 and 44.

3 units, Spr (Lele)

101. Visual Thinking—Lecture/lab. Visual thinking and language skill is developed and exercised in the context of solving design problems. Exercises for the mind’s eye. Quickly executed diagrammatic, orthographic, perspective, and three-dimensional sketching with emphasis on fluent and flexible idea production. The relationship between visual thinking and the creative process. Enrollment limited to 60.

3 units, Aut, Win, Spr (Staff)

102. Integration, Prototyping, Design, and Evaluation—The integration of human values, technology, and manufacturing towards engineering solutions to design problems. Emphasis is on development and timely evaluation of potential candidates through the use of methodology, computers, and rapid prototyping techniques. Lecture and lab. Enrollment limited to 20.

3 units, Aut (Milroy)

103. Manufacturing and Design—(Graduate students register for 303.) Emphasis is on prototype development techniques as an intrinsic part of the design process. Fundamentals of machining, welding, and casting introduced in lecture and supported by lab experience. Manufacturing processes through lecture, films, and field trips. Design aspects developed in an individual term project chosen, designed, and fabricated by students. 103D is normally taken concurrently unless student has prior drafting experience. Limited enrollment.

4 units, Aut (Beach)

103D. Engineering Drawing—Fundamentals of engineering drawing including orthographic projection, dimensioning, sectioning, exploded and auxiliary views, and assembly drawings. Designed to accompany 103. Homework drawings are of parts fabricated by the student in the shop. Major assignments in 103 are supported by material in 103D and assignment dates are sequenced on the assumption that the student is enrolled in both courses simultaneously.

1 unit, Aut, Win (Milroy)

104. Dynamic Behavior—(Enroll in Engineering 104.)

105. Feedback Control Design—(Enroll in Engineering 105.)

109. Computer Aided Design of Model Yachts—(Graduate students register for 209.) Hands-on introduction to the art and science of engineering and manufacturing. Students design and construct free sailing model yachts to a high standard of craftsmanship using Computer Aided Design and Manufacturing (CAD/CAM). Theory (aerodynamics and hydrodynamics of sailboats), model yachts design (nomenclature, scaling issues, lofting, history of rating rules, yacht aesthetics, tradeoffs between speed and control), the use of MaxSurf, Vellum, and laser-cutter (design and manufacturing systems), necessary construction techniques (forming hull casting ballast, sewing sails, finishing, and rigging), and sailing practice and tuning for performance. Field trips. Enrollment limited to 30.

4 units, Spr (Staff)

111. Stress, Strain, and Strength—Review of free body diagram and basic elastic stress. Static failure theories. Buckling (column, plate, local). Fatigue failure criteria and life prediction methods. Introduction to fracture mechanics, corrosion, and residual stresses. Contact stresses and surface failures (fretting, pitting, wear). Homework assignments emphasize applications to mechanical design.

3 units, Aut (Staff)

112A,B,C. Mechanical Systems Design—Three modules, run in series, are each assigned a separate grade. Students sign up for all three modules.

112A. Two and one-half weeks. System design issues. Prerequisites: 111, 103.

1 unit, Win (Sheppard)

112B. Five weeks. Systems and component design decisions through the study of existing machines. Prerequisite: 112A.

2 units, Win (Sheppard)

112C. Two and one-half weeks. Strategies for effective design. Prerequisite: 112B.

1 unit, Win (Sheppard)

113. Engineering Design—Create designs and models of new mechanical devices. Design is studied as an activity and experienced by students as they work on a team design project obtained from industry and other sponsoring organizations. Prerequisites: 101, 103, 111, 112.

3 units, Spr (Staff)

115A. Human Values in Design—Active encounters with human values in design. Lectures survey central philosophy of product design program, emphasizing the relation between technical and human values, the creative process, and design methodology. Lab exercises include development of simple product concepts visualized in rapidly executed three-dimensional mockups. Prerequisite: 101.

3 units, Win (Staff)

115B. Expression of Function—Numerous tightly constrained design projects requiring reconciliation of manufacturing, human factor, and aesthetic concerns; solutions presented in a variety of design media. Prerequisites: 103, 115A; Art 60.

3 units, Spr (Staff)
115C. Design Sketching—Freehand sketching, rendering, and design development. Work is guided by instructors. Concurrent assignments in 115A,B provide subject matter, but the class is open to anyone wishing to improve freehand drawing skills. 
1 unit, Win, Spr (Staff)

116A. Advanced Product Design: Formgiving—Small- and medium-scale design projects are carried to a high degree of aesthetic refinement. Emphasis is on generating from the appropriate to the task and setting. Prerequisites: 115B, Art 160.
3 units, Spr (Staff)

116B. Advanced Product Design: Conceptualization—Exploration of human needs that leads to conceptualization of future products, environments, systems, and services. Field work in public and private settings; appraisal of personal values; readings on social issues; and need-finding for a corporate client. Emphasis is on developing the flexible thinking skills that enable the designer to navigate the future.
3 units, Win (Faste, Turnbull)

116C. Advanced Product Design: Implementation—Summary project utilizing knowledge, methodology, and skills obtained in 115A,B, and 116A,B. Students implement design concept and present it to a professional jury. Prerequisite: 116B.
3 units, Spr (Staff)

116D. Advanced Design Sketching—Free hand sketching, rendering, and design development. Work is guided by instructors. Concurrent assignments in 116A provide subject matter. Prerequisite: 115C or consent of instructor based on drawing skill. (AU)
1 unit, Win (Staff)

117. Introduction to Sensors—(Graduate students register for 220.) Sensors are widely used in scientific research and as an integral part of commercial products and automated systems. Basic principles for sensing displacement, force, pressure, acceleration, temperature, optical radiation, nuclear radiation, and other physical parameters. Performance, cost, and operating requirements of available sensors. Elementary electronic circuits which are typically used with sensors. Lecture demonstration of a representative sensor from each category elucidates operating principles and typical performance. Lab experiments with off-the-shelf devices.
3-4 units, Aut (Kenny)

118. Introduction to Mechatronics—Open to undergraduate and graduate students. Introduces technologies involved in mechatronics (Intelligent Electro-Mechanical Systems) and the techniques necessary to apply this technology to mechatronic system design. Topics: electronics (A/D, D/A converters, op-amps, filters, power devices); software program design, event-driven programming; hardware and DC Stepper motors, solenoids, and robust sensing.

Lab component of structural assignments and open-ended team project. Limited enrollment. Prerequisites: Engineering 40, Computer Science 106, or equivalent.
4 units, Win, Spr (Carreyer, Kenny)

119. Precision Engineering—Lectures, lab experiences, field trips, individual design and fabrication projects, current topics of interest in manufacturing, emphasizing precision engineering. What concepts and technologies enable microinch resolution and repeatability? What are the applications for ultra-precision machining and measuring systems? Students select projects from "customers" with research applications on campus and pursue them to hardware. Final project presentation should demonstrate the application of design skills to some problem in precision engineering. Limited enrollment.
3 units, Spr (Beach, DeBra)

120. History and Philosophy of Design—Major schools of 19th- and 20th-century design (Arts-and-Crafts Movement, Bauhaus, Industrial Design, and post-modernism) are analyzed in terms of their continuing cultural relevance. The relation of design to art, technology, and politics; readings from principal theorists, practitioners, and critics; recent controversies in industrial and graphic design, architecture, and urbanism. Enrollment limited to 40.
3 units, Spr (Katz)

130. Internal Combustion Engines—Internal combustion engines including conventional and turbo-charged spark ignition, diesel engines. Lectures: basic engine cycles, engine components, methods of analysis of engine performance, pollutant emissions, and methods of engine testing. Lab involves hands-on experience with engines and test hardware. Limited enrollment. Prerequisites: Engineering 30, 131A (or concurrent enrollment in 131A), or equivalent.
3 units, Aut (Edwards)

131A. Heat Transfer—(Graduate students register for 250.) First of three-quarter sequence. Topics: fluid mechanics, heat transfer, and thermodynamics with emphasis on basic principles used in the energy sciences and their application in man-made systems. Lab is devoted to demonstration and experiments in the specific lecture area and covers basic experimental procedure, including measurement techniques, experiment design, data collection, processing, and evaluation. Prerequisites: 33, Engineering 30. Recommended: intermediate calculus, ordinary differential equations.
5 units, Aut (Goodson)

131B. Fluid Mechanics—Continuation of 131A.
3 units, Win (Lele)

131C. Thermodynamics—Continuation of 131B.
3 units, Spr (Mitchell)

132. Thermosciences Laboratory—Demonstrates the utility of experimentation in thermosciences and
PRIMARILY FOR GRADUATES
ENGINEERING MATHEMATICS AND COMPUTATION

200A, B, C are intended for students in the master’s program with some proficiency in undergraduate engineering mathematics and computing. Students enrolling in this sequence should have had some exposure to elementary linear algebra (for example, elementary operations with matrices), ordinary differential equations (for example, Math. 130), partial differential equations, and computer programming. Students who do not meet these guidelines should be prepared to devote additional remedial time to these courses or consider satisfying their mathematics requirements through Math. 113 and 131, and Computer Science 137.

133. Stanford Introductory Seminar: Experimental Fluid Mechanics—Preference to sophomores. Group research project using a wind tunnel to investigate a problem of current interest. Students design and fabricate the test model then acquire data using flow visualization and quantitative instrumentation systems. Computerized data acquisition techniques introduced and used on the project. Lab.
3 units, Win (Fessler, Eaton)

161. Dynamic Systems—Linear modeling, analysis, and measurement of mechanical and electromechanical systems. Topics: resonance, damping, stability, harmonic analysis, and force transmission. Extensions to multiple degrees of freedom using computers. Demonstrations and practical examples. Assumes a background in dynamics and math. Enrollment limited to 60. Prerequisites: Engineering 12, Math. 43, or equivalent; Math. 113 and Engineering 40, or equivalent (can be taken concurrently).
4 units, Aut (V. K. Jones)

180. Form and Function of the Musculoskeletal System—Lecture and anatomical laboratory studies of musculoskeletal anatomy and biomechanics. Limited enrollment.
2 units, Spr (Carter, Staff)

191. Engineering Problems and Experimental Investigation—Directed study and research for undergraduates on a subject of mutual interest to student and staff member. Student must find faculty sponsor and have approval of the adviser.
1-5 units, any quarter (Staff)

UNDERGRADUATE AND GRADUATE

The following are especially suitable for advanced undergraduates and graduates and may be used to satisfy the M.S. requirement, item '3' above, approved electives.

103. Manufacturing and Design
105. Feedback Control Design—(Enroll in Engineering 105)
113. Engineering Design
161. Dynamic Systems Design
255. Gasdynamics
250. Heat Transfer

introduces modern lab techniques, e.g., A/D converters for digital data acquisition. Two major experiments are performed, drawn from all areas of thermosciences. Experimental design project spans course. Emphasis is on communication of results through written and oral reports and in evaluation of data using formal methods of uncertainty analysis. Enrollment limited to 30 preregistered students. Lab. Prerequisites: 33, 131A, and Engineering 30. 3 units, Win, Spr (Fessler, Eaton)

180. Form and Function of the Musculoskeletal System—Lecture and anatomical laboratory studies of musculoskeletal anatomy and biomechanics. Limited enrollment.
2 units, Spr (Carter, Staff)

191. Engineering Problems and Experimental Investigation—Directed study and research for undergraduates on a subject of mutual interest to student and staff member. Student must find faculty sponsor and have approval of the adviser.
1-5 units, any quarter (Staff)

206. Similitude in Engineering Mechanics—(Enroll in Aeronautics and Astronautics 218.)

**DESIGN AND CONTROLS**


210A. Experiences in Team-Based Design—First of three-quarter series. Design by immersion in a product development environment for interdisciplinary, distributed, engineering design teams. Series of four design-development cycles, each with different team members and functional hardware outcomes; application of design theory and methodology to design practice. Work guided by case readings. May be taken alone, but required to continue to 210B, C. Enrollment limited and based on a statement of learning objectives due the second day of class.

4 units, Aut (Cutkosky, Leifer)

210B. Team-Based Design-Development with Corporate Partners—(Continuation of 210A.) Following project selection, design team refines the problem statement, defines detailed functional, physical, and external requirements and develops the socio-technical infrastructure for self-management. Design teams are supported by a professional coach, corporate liaison, and faculty advisor. Corporate projects provide the technical content, motivation, and financial resources for a six-month product development cycle. Design alternatives are subjected to rigorous examination by computational and physical simulation, trade-off analysis, and literature review. Manufacturability, assembly, test, service, life-cycle-cost, human factors, and design for redesign are stressed. At least one design alternative is developed into a full-scale, functional prototype. Limited enrollment. Prerequisite: 210A.

4 units, Win (Cutkosky, Leifer)

210C. Team-Based Design-Development with Corporate Partners—(Continuation of 210B.) Final designs and function prototypes are presented to corporate sponsors at the Design Affiliates Conference the first week in June. Limited enrollment.

4 units, Spr (Cutkosky, Leifer)

211A, B, C. Product Design Master's Thesis—For Product Design or Design (Art) majors only. Students create and present two masters' theses under the supervision of engineering and art faculty. Theses involve the synthesis of aesthetics and technological concerns in the service of human need and possibility. Corequisite: Art 360.

211A. 2-4 units, Aut (Faste, Kelley)

211B. 2-4 units, Win (Faste, Kelley)

211C. 2-4 units, Spr (Faste, Kelley)

212. Calibrating the Instrument—Calibrating the mind/body ‘instrument’ regarding the aesthetic, kinetic, sensory, empathetic, and intellectual information known by the designer. Improvisation, educational Kinesiology, Brian-Gym, Zazen, and other methods center and inform the designer. Corequisite: 211A.

2 units, Aut (Faste)

213. Computer-Aided Prototyping—Prototype design and fabrication emphasizing the use of computer supported tools in the design process. Students choose, design, and build individual projects. The tool set includes Hewlett Packard and PC-based CAD, CNC part programming software, and CNC milling machines. Lectures alternate between student and instructor presentations of work in progress. Enrollment limited to 12; priority based on student project proposals made at the first class meeting. Coaching in project development is available from instructors during Autumn and Winter Quarters. Lab.

3 units, Spr (Milroy)

214. Good Products and Bad Products—(Same as Industrial Engineering 214.) An analysis of characteristics of industrial products that can cause them to be successes or failures. These range from the straightforward (performance, economy, reliability) through the complicated (human and cultural fit, compatibility with the environment, craftsmanship, positive emotional response of the user) to the esoteric (elegance, sophistication, symbolism). Engineers and business people must better understand these factors if they are to produce more successful products. Readings, lectures, projects, papers, guest speakers, and field trips. Enrollment limited.

3 units, Win (Adams)

215. The Designer in Society—Open to all graduate students. Participants' career objectives and psychological orientation are compared with existing social values and conditions. Emphasis is on assisting individuals in assessing their roles in society. Readings on political, social, and humanistic thought related to technology and design. Term project. Enrollment limited to 24.

3 units (Roth) not given 1997-98

216. Introduction to Aircraft Design, Synthesis, and Analysis—(Enroll in Aeronautics and Astronautics 241A.)

217A. Design for Manufacturability: Methodology—Addresses systematic methodologies to define, develop, and produce competitive products. Methods cover characterization of user values, design for manufacturability, and environmental compatibility. 217A addresses the key issues for product competitiveness. Student teams identify opportunities for improvement and develop a comprehensive product definition. Topics: design for value, functional analysis, quality function deployment, value engineering, design for assembly, product line structuring, process and material selection, design for
ally sponsored project is the culmination of the Smart Product Design sequence. Student teams take an industrial project that requires the application and extension of the knowledge gained in the prior three quarters, including prototyping of a final solution with hardware, software, and professional documentation and presentation. Lectures extend the students’ knowledge of electronic and software design and electronic manufacturing techniques. Topics: chip level design of microprocessor systems, real time operating systems, alternate microprocessor architectures.

4 units, Aut (Carrier)

219. Introduction to Robotics—(Enroll in Computer Science 223A.)

220. Introduction to Robotics—See 117.

221. Materials Selection in Design—(Enroll in Material Science and Engineering 270.)

222. Kinematic Synthesis of Mechanisms—The rational design of linkages. The problem of determining linkage proportions to fulfill various design requirements, treated analytically. Topics: two-dimensional displacements and motions, the theory of higher plane curves, higher-order path-curvature analysis, circle and center-point theory.

3 units (Roth) not given 1997-98

223. Creativity and Innovation in Organizations—(Enroll in Industrial Engineering 201.)

225A. Control System Design and Simulation—(Enroll in Engineering 206.)

225B. Optimal and Nonlinear Control—(Enroll in Engineering 209.)

226A. Modern Control Design I—(Enroll in Engineering 207A.)

226B. Modern Control Design II—(Enroll in Engineering 207B.)

228. Introduction to Control Design Techniques—(Enroll in Engineering 205.)

MECHANICS OF SOLIDS

230. Advanced Kinematics—Kinematics from mathematical viewpoints. Introduction to algebraic geometry of point, line, and plane elements. Emphasis is on basic theories which have potential application to mechanical linkages, computational geometry, and robotics.

3 units (Roth) not given 1997-98

a force. Resultant of forces. Generalized active forces. Generalized inertia forces. 3 units, Aut (Heegaard)


233A. Dynamical Systems—Dynamical systems are governed by mappings or ordinary differential equations; the primary application is in making predictions concerning the long-time behavior of such systems. Problems arise in applications such as weather prediction, turbulence, and planetary interactions. Topics: long time behavior, stability, bifurcation, chaos, invariant manifolds, attractors, and Hamiltonian systems. Theory is illustrated with examples from mechanics. Prerequisites: Math. 130, consent of instructor. 3 units (Staff) given 1998-99

233B. Numerical Analysis of Dynamical Systems—The design and analysis of numerical methods for the simulation of ordinary differential equations exhibiting complicated dynamical behavior. Problems arise in applications such as weather prediction, turbulence, and planetary interactions. Topics: Runge Kutta and multistep methods, convergence of invariant sets, long-time numerical stability, integration, and Hamiltonian problems. Prerequisite: 233A or Math. 276. 3 units (Staff) given 1998-99


234B. Finite Element Methods in Fluid Mechanics—Continuation of 234A. 3 units (Hughes) given 1998-99

234C. Finite Element Methods in Fluid Mechanics—Continuation of 234B. 3 units (Hughes) given 1998-99

235A. Finite Element Analysis—Emphasis is on fundamental concepts and techniques of "primal" finite element methods. Method of weighted residuals, Galerkin's method, and variational equations. Linear elliptic boundary value problems in one, two, and three space dimensions: applications in structural, solid, and fluid mechanics and heat transfer. Properties of standard element families, numerically integrated elements including reduced integration. Mixed penalty and generalized displacement methods for application to constrained field theories such as classical plate theory, incompressible elasticity, Stokes flow, etc. Thick and thin beams, plates, and shells. Implementation of the finite element method. Compact column equation solver, assembly of equations, and element routines. Comparison of finite element results with exact solutions. Brief treatment of the mathematical theory of finite elements. 3 units (Hughes)


236. Wave Propagation—Enroll in Math. 274.

237. Free and Forced Motion of Structures—Enroll in Aeronautics and Astronautics 244A.

Closing the equations through constitutive modeling.

3 units, Aut (Stuart)

238B. Continuum Mechanics: Nonlinear and Inelastic Materials—Introduction to constitutive theory for nonlinear and inelastic materials; phenomenology of plastic deformation, dislocations and crystal plasticity; rate-independent plasticity, yield criteria, flow rule, sand hardening rules; uniqueness and extremum theorems, limit analysis; theory of viscoplasticity, internal variable formulation and thermodynamics; extension to finite deformation rate-independent plasticity and viscoplasticity; nonlinear viscoelasticity; applications for metals, rock and soil; analytical solution of plasticity problems, limit analysis of plastic collapse for beams, plates, and shells.

3 units, Spr (Pinsky)

238C. Boundary Integral Methods—Integral equation methods for numerically solving problems in elasticity and fracture. Prerequisite: 238B.

3 units, Spr (Pinsky)

239A. Computational Methods for Nonlinear Solids: Infinitesimal Deformation—Introduction to modern methods of analysis for nonlinear material behavior. Focus is on deviations from linearity in the constitutive relations based on a mathematical and phenomenological description of viscoelastic, elastoplastic and viscoplastic classes of material behavior and covering a spectrum of solids (rubber, polymers, polycrystalline metals, rock, soil, concrete biological tissues, etc.). Constitutive equations are derived for each class of material behavior. Formulation and analysis of numerical algorithms employed in computations involving these constitutive models. Topics: hereditary response of viscoelastic solids; ID models for rate-independent plasticity, hardening effects, interpretation in terms of optimization theory, return mapping algorithms, and notions of numerical stability; formulations of viscoplasticity and integration of the rate constitutive equations, relation to the rate-independent model and numerical implementations exploiting this connection; extension of the plasticity models to multiple dimensions. Application to finite element modeling and simulation.

3 units (Pinsky) given 1998-99

239B. Computational Methods for Nonlinear Solids: Finite Deformation—The models for nonlinear solid mechanics and their computational implementation in 239A are extended to the geometrically nonlinear regime. Review of the basic, essential concepts in nonlinear continuum mechanics, kinematics, stress tensors, the notion of hyperelasticity, frame indifference, objective stress rates, isotropy and some fundamental material constitutive models. The traditional approach to finite plasticity in the framework of hypoelasticity and the difficulties inherent in this approach. Multiplicative finite strain plasticity and underlying kinematics, Hyperelastic framework for rate-independent plasticity. Computational return mapping algorithm for finite strain plasticity. Finite element methods suitable for finite strain plasticity. Extensions to viscoplasticity and viscoelasticity.

3 units (Pinsky) given 1998-99

239C. Continuum Mechanics: Nonlinear and Inelastic Material—Introduction to constitutive theory for nonlinear and inelastic materials; phenomenology of plastic deformation, dislocations and crystal plasticity; rate-independent plasticity, yield criteria, flow rules and hardening rules; uniqueness and extremum theorems, limit analysis; theory of viscoplasticity, internal variable formulation and thermodynamics; extension to finite deformation rate-independent plasticity and viscoplasticity; nonlinear viscoelasticity; applications for metals, rock and soil; analytical solution of plasticity problems, limit analysis of plastic collapse for beams, plates, and shells.

3 units, Aut (Stuart)


3 units, Win (Gao)


3 units, Win (Gao)


3 units (Gao) given 1998-99

241A. Theory of Plates—Analysis of stress, deformation in plates bent by transverse loads. Applications to circular, rectangular, other shapes. Vibra-
241B. Theory of Shells—Axisymmetric deformation of shells of revolution. Asymptotic expansions, direct and bending stress. Application to design of domes, pressure vessels, expansion joints and pressure sensing devices. Use of asymptotic solutions for “very large finite element computation.” Prerequisite: 111 or Civil Engineering 114.

3 units, Aut (Steele)


3 units, Spr (Steele)

242. Classical Dynamics—(Enroll in Aeronautics and Astronautics 242.)

243. Micromechanics—(Enroll in Material Science and Engineering 350.)


3 units, Win (Nelson)

247A. Microstructure and Mechanical Properties—(Enroll in Materials Science and Engineering 251.)

248. Experimental Stress Analysis—Theory and applications of photoelasticity, strain gages, and holographic interferometry. Comparison of test results with theoretical predictions of stress and strain. Discussion of other methods of stress and strain determination (acoustoelasticity, thermoelasticity, brittle coating, Moiré). Student project on use of strain gages “in the field.” Limited enrollment. Lab, fee.

3 units, Spr (Nelson)

HEAT TRANSFER, FLUID MECHANICS, AND HIGH TEMPERATURE GAS DYNAMICS

250. Heat Transfer—For graduate students; see 131A.

3 units, Aut
flows. Prerequisites: 250, 251B, or equivalents.


3 units (Edwards) not given 1997-98

254. Computers and Instrumentation in the Fluid Mechanics Laboratory—Use of computers including interfacing of analog and digital instruments, experimental control, sampling strategies, and data reduction techniques. Instrumentation including hot-wire, laser-Doppler and particle imaging anemometers. Lab. Prerequisite: previous experience with computer programming.

4 units, Spr (Fessler)


3 units, Win (Mungal)

258. Heat Transfer in Microdevices—Application-driven introduction to the thermal design of electronic circuits, sensors, and actuators that have dimensions comparable to or smaller than one micrometer. Impact of thin-layer boundaries on thermal conduction and radiation. Convection in microchannels and microscopic heat pipes. Thermal property measurements for microdevices. Emphasis on Si and GaAs semiconductor devices and layers of unusual, technically-promising materials, e.g., porous silicon and chemical-vapor-deposited (CVD) diamond. Final project can be based on student research interests. Prerequisite: consent of instructor.

3 units (Goodson) not given 1997-98

259A. Numerical Methods in Fluid Mechanics—(Enroll in Aeronautics and Astronautics 214A.)

259B. Numerical Computation of Compressible Flow—(Enroll in Aeronautics and Astronautics 214B.)

259C. Numerical Computation of Viscous Flow—(Enroll in Aeronautics and Astronautics 214C.)


3 units, Spr (Durbin)

261B. Analytical Methods for Turbulent Flows—The analytical framework of homogeneous turbulence, turbulent transport, rational modeling of turbulence in flows of engineering interest, zonal models for turbulent flows and sub-grid scale and near-wall modeling for large eddy simulation. Prerequisites: 261A, graduate sequence in fluid mechanics.

3 units (Reynolds) given 1998-99

262A. Physical Gas Dynamics—Concepts and techniques for description of high-temperature and chemically reacting gases from a molecular point of view. Introductory kinetic theory, chemical thermodynamics, and statistical mechanics as applied to properties of gases and gas mixtures. Transport and thermodynamic properties, law of mass action, and equilibrium chemical composition. Maxwellian and Boltzmann distributions of velocity and molecular energy. Examples and applications from areas of current interest, e.g., combustion and gas radiation.

3 units, Aut (Cappelli)

262B. Nonequilibrium Processes in High-Temperature Gases—Introduction to chemical kinetics and energy transfer in high-temperature gases. Collision theory, transition state theory, and unimolecular reaction theory. Vibration-translation energy transfer. Prerequisite: 262A.

3 units (Hanson) alternate years, given 1998-99

263. Partially Ionized Plasmas and Gas Discharges—Introduction to partially ionized gases and the nature of gas discharges. Topics: fundamentals of plasma physics emphasizing collisional and radiative processes, electron and ion transport, ohmic dissipation, oscillations and waves, interaction of electromagnetic waves with plasmas. Applications discussed include plasma diagnostics, energy conversion devices, and materials processing. Prerequisite: 262A or consent of instructor.

3 units, Spr (Cappelli)

264. Optical Diagnostics and Spectroscopy—Introduction to spectroscopy of gases and laser-based diagnostic techniques for measurements of species concentrations, temperature, density, and other flow field properties. Topics: electronic, vibrational, and rotational transitions; spectral line shapes and broadening mechanisms; absorption, fluorescence, Rayleigh and Raman scattering methods; collisional quenching. Prerequisite: 262A or equivalent.

3 units, Win (Hanson)
Optical Diagnostics and Spectroscopy Laboratory—Introduction to principles, procedures, and instrumentation associated with optical measurements in gases and plasmas. Absorption, fluorescence and emission, and light-scattering methods. Measurements of temperature, species concentration, and molecular properties. Lab. Enrollment limited to 16. Prerequisites: 262A and/or 264. 4 units, Spr (Hanson)

Computational Methods in Fluid Mechanics—Finite difference methods for solving partial differential equations, emphasizing the equations of fluid dynamics. Integral methods for boundary layers and their coupling to potential flow solutions, boundary integral methods for potential flow, choice of dependent variables, finite difference methods for solving boundary layer problems, finite difference methods for incompressible flows including turbulent flows, introduction to large eddy simulation. Prerequisites: 200C, 252B, or equivalents. 3 units, Aut (Ferziger)

THERMODYNAMICS AND ENERGY CONVERSION

Engineering Thermodynamics—Thermodynamic analysis of engineering systems emphasizing systematic methodology for application of basic principles. Introduction to availability analysis. Thermodynamics of gas mixtures and reacting systems. Modern computational equations of state. Thermodynamics of condensed phases. Prerequisites: undergraduate background in engineering thermodynamics and computer skills. 3 units, Aut (Reynolds)

Combustion Fundamentals—Heat of reaction, adiabatic flame temperature, and chemical composition of products of combustion; kinetics of combustion and pollutant formation reactions; conservation equations for multi-component reacting flows; propagation of laminar premixed flames and detonations. Prerequisite: 262A or 270, or consent of instructor. 3 units, Win (Mitchell)

Combustion Applications—Role of chemical and physical processes in combustion; ignition, flammability, and quenching of combustible gas mixtures; premixed turbulent flames; laminar and turbulent diffusion in flames; combustion of fuel droplets and sprays; combustion of solid fuels. Prerequisite: 271 or consent of instructor. 3 units, Spr (Bowman)

BIOMECHANICAL ENGINEERING

Biomechanical Engineering Seminar—Invited speakers present research topics at the interfaces of biology, medicine, physics, and engineering. (AU) 1 unit, Aut, Spr (Valero)

Orthopedic Biomechanics—Engineering mechanics applied to the musculoskeletal system. Material and structural characteristics of bones, ligaments, muscle/tendon, and synovial joints. Skeletal developmental mechanics and functional adaptation. Engineering evaluation of orthopaedic procedures and devices. Correlation between engineering predictions and clinical/biological results. Introductory anatomy and physiology. 3 units, Aut (Carter, Staff)

Biomechanical Engineering Projects I—Interdisciplinary approaches are used in formulating research and development project proposals associated with patient care. Possible topics: fracture plate fixation, neuromuscular coordination, artificial joint replacement, rehabilitation devices. Attendance at Orthopaedic and Rehabilitation grand rounds. Lab. Limited enrollment. 4 units, Win (Carter, Staff)

Biomechanical Engineering Projects II—Research and development projects are executed with the guidance of project coaches. Oral presentations and written proposals, papers, and reports. Attendance at Orthopaedic and Rehabilitation grand rounds. Prerequisite: consent of instructor. 4 units, Spr (Carter, Staff)

Computational Musculoskeletal Biomechanics—Review of specific computer modeling techniques used to solve problems in musculoskeletal biomechanics. Multibody dynamics, gait analysis, sports performance. Joint biomechanics, total joint replacement, surgery simulation. Soft tissue mechanics, connective tissue constitutive models, multiphasic theory. Bone adaptive behavior, growth, and remodeling. Prerequisite: 281. 3 units, Spr (Heegaard)

DIRECTED STUDY AND SEMINARS

Thermosciences Research Project Seminar—Review of work in a particular research program and presentations of other related work. (AU) 1 unit, Aut, Win, Spr (Staff)

Engineering Problems—Directed study for graduate engineering students on subjects of mutual interest to student and staff member. May be used to prepare for experimental research during a later quarter under 292. Students must find a faculty sponsor. 1-5 units, any quarter (Staff)

Teaching Participation—Credit is given for assisting a professor in the teaching of a mechanical engineering course. Consent of supervising instructor required. 1-3 units, Aut, Win, Spr (Staff)

Experimental Investigation of Engineering Problems—Graduate engineering students undertake experimental investigation under guidance of
staff member. Previous work under 291 may be required to provide background for experimental program. Faculty sponsor required.

1-5 units, any quarter (Staff)

293A. Interaction Design Project—Two-quarters; students working in small, interdisciplinary teams observe and analyze people in work or play situations and design objects whose functionality is significantly determined by their embedded software. Prototype is submitted to an international design competition. Material focuses on computer interfaces, interaction, and design aesthetics and some of the underpinnings of successful design: a reflective, interactive design process, group dynamics of effective multidisciplinary teamwork, and working with users. Students from computer science, the social sciences, and business, medicine, and education. Limited enrollment. Prerequisite: depth knowledge in one of the relevant disciplines mentioned above.

1 unit, Win (Kelley, Winograd)

293B. Interaction Design Project—Priority registration given to continuing 293A students. Limited enrollment.

5 units, Spr (Kelley, Winograd)

294. Design Forum—Invited speakers address issues of interest to designers. Brief presentation followed by open discussion. Spring Quarter emphasis on manufacturing and design. (AU)

1 unit, Aut, Win (Kenny)

Spring (Beach)

294X. Composition and Dynamics of Design Teams—Psychological theories underpinning methods used for composing prize-winning ME210 Engineering Design teams. Four types of measuring instruments; the Quad Brain Model. New strategies are developed by instructor and students for constructing teams, trouble-shooting their interpersonal problems, and teaching psychological essentials to engineering students.

1 unit, Spr (Wilde)

295. Seminar in Solid Mechanics—Problems in all branches of solid mechanics. All Ph.D. candidates in solid mechanics are normally expected to attend. (AU)

1 unit, Aut, Win, Spr (Staff)

296. Manufacturing Systems Engineering Forum—Invited speakers address issues of interest to design and manufacturing engineers. Brief presentations are followed by open discussion. Sponsored by Stanford Engineering Club for Automation and Manufacturing. (AU)

1 unit, Aut, Win, Spr (Staff)

297. Design Theory and Methodology Forum—A mixture of research reports, literature reviews, and designer interviews promote vigorous examina-
313. Ambidextrous Thinking—Visual and kinesiologic skills are developed and exercised in solving design problems. Quickly executed perspective, orthographic, diagrammatic, and three-dimensional sketches are emphasized in conjunction with fluent and flexible idea production. Exercises to appreciate and develop the entire body’s role in creative thinking. Enrollment limited to 60.

3 units, Aut (Faste)

314. Introduction to Mechanical Issues in Solid State Physics—Introductory overview of principles of statistical mechanics, quantum mechanics, and solid-state physics. Provides graduate mechanical engineering students with the understanding needed to work on devices or technologies which rely on solid-state physics.

3 units, Aut (Paste)

315A,B- Integrated Design in Marketing and Manufacturing—(Same as Business 309, 310.) Teams of students (two engineers and two MBAs) work an integrated exercise of market research, product design prototype manufacturing, and product management in a specified market domain. IDMM integrates depth in the market research technique and conjoint analysis with education in prototyping methods supported by the Product Realization Laboratory. “Customer ready prototypes” are launched to perspective customers whose attribute and product based preferences are encoded to form the basis of a computer simulated market. Teams compete for profitability by managing the price and production quantities of their products in the market. IDMM aims to graduate leaders in product development. Students must enroll both quarters. Limited enrollment.

4 units, Aut, Win (Beach, Srinivasan)

319. Robotics and Vision Lab—For graduate students with some familiarity in robotics who want project experience with robotic and vision systems. Current topics in robotics and machine vision with applications to flexible, automated manufacturing; emphasis on integrated problems and techniques for fine motion control, calibration, acquisition of sensory data, and programming. Cell level issues: architectures and strategies for cell control. Research issues: dextrous manipulation and languages for high-level task specification. Typical projects: robotic deburring, assembly using force feedback and/or vision, part inspection, and cell control. Short assignments provide practice with various equipment. Enrollment limited to 30. Prerequisites: 219A or equivalent, some familiarity with programming.

3 units (Cutkosky) not given 1997-98

327A. Advanced Robotic Manipulation—(Enroll in Computer Science 327A.)

327B. Introduction to Computer Vision—(Enroll in Computer Science 223B.)

ADVANCED FLUID MECHANICS

351A. Advanced Fluid Mechanics—For advanced students specializing in fluid mechanics. Topics: kinematics (analysis of deformation, critical points and flow topology, Helmholtz decomposition); constitutive relations (viscous and visco-elastic flows, non-inertial frames); vortex dynamics; circulation theorems, vortex line stretching and rotation, vorticity generation mechanisms, vortex filaments and Biot-Savart formula, local induction approximation, impulse and kinetic energy of vortex systems, vorticity in rotating frame. Prerequisite: graduate-level courses in compressible and viscous flow.

3 units (Lele) not given 1997-98

351B. Advanced Fluid Mechanics—Waves in fluids: surface waves, internal waves, inertial and acoustic waves, dispersion and group velocity, wave trains, transport due to waves, propagation in slowly varying medium, wave steepening, solitons and solitary waves, shock waves. Stability of fluid motion: dynamical systems, bifurcations, Kelvin-Helmholtz instability, Rayleigh-Benard convection, energy method, global stability, linear stability of parallel flows, necessary and sufficient conditions for stability, viscosity as a destabilizing factor. Focus is on flow instabilities. Prerequisites: graduate-level courses in compressible and viscous flow.

3 units, Aut (Lele)

pressible turbulent flows and large eddy simulation. Prerequisites: 255, 261A, or equivalents.

3 units, Win (Moin, Mahesh)

370. Turbulent Reacting Flows—Review of turbulence, physics and modeling; review of combustion, laminar flames and effects of stretch (strain and curvature); mixing in turbulent flows, physics and modeling; turbulent combustion with fast chemistry, Burke-Schumann-like approximations and G-equation; turbulent combustion with slow chemistry, well stirred reactor; moderate Damkohler number combustion, flame distortion and structure changes; simulation of turbulent combustion, direct numerical simulation and prospects for large eddy simulation; modeling turbulent combustion, detailed models (Broadwell type), eddy break-up model, other RANS models, and PDF models; sprays in turbulent combustion. Prerequisites: 251A,B.

3 units, Win (Ferziger, Mungal)

OTHER

390. Introduction to Fortran—Four-week intensive introduction to Fortran 77 and Fortran 90. Primarily designed for advanced undergraduate and beginning graduate students in science and engineering disciplines who need to be able to develop, or understand, and modify Fortran programs. Examples focus on scientific computing, especially numerical linear algebra. Prerequisite: familiarity with basic programming concepts. Recommended: some experience with a computer language like Basic, Pascal, C, or C++. (AU)

1 unit, Win, Staff

SCIENTIFIC COMPUTING AND COMPUTATIONAL MATHEMATICS PROGRAM

Director: Gene Golub
Associate Director: Andrew Stuart
Core Faculty: Gene Golub (Computer Science), Robert Dutton (Electrical Engineering), George M. Homsy (Chemical Engineering), Joseph B. Keller (Mathematics, emeritus), Walter Murray (Engineering-Economic Systems and Operations Research), Joseph Oliger (Computer Science), George Papanicolaou (Mathematics), Andrew Stuart (Computer Science and Mechanical Engineering)

Associate Faculty: Khalid Aziz (Petroleum Engineering), Joel Ferziger (Mechanical Engineering), Thomas J. Hughes (Mechanical Engineering), Thomas Kailath (Electrical Engineering), T. P. Liu (Mathematics)


The Scientific Computing and Computational Mathematics Program (SC/CM) is interdisciplinary and leads to the M.S. and Ph.D. degrees. It is designed for students interested in studying and developing computational tools in those aspects of applied mathematics central to modeling in the physical and engineering sciences. Graduates of this program are expected to be able to deal with a scientific problem from its formulation, moving through its mathematical analysis to algorithm development and implementation. The symbiosis of applied mathematics and numerical computing is stressed.

The program prepares students for research in the rapidly expanding field of supercomputing.

GRADUATE PROGRAMS

MASTER OF SCIENCE

A candidate must complete a program of 46 units of courses numbered 100 or greater. In addition, a number of courses at the 200 level or above are required. At least 36 of these units must be graded units, passed with a grade point average (GPA) of 3.0 (B) or better. The core curriculum is common to all degrees offered by the program but is adapted according to the interests and prior education of the student. Deviations from the core curriculum must be justified in writing and approved by the student’s adviser and the SC/CM Committee. Courses that are waived rather than taken may not be counted towards the master’s degree. The student must fulfill credit requirements in each of the categories listed below.

CORE CURRICULUM

1. Mathematics (18 units): students are required to take Math. 220A,B,C. Nine additional units in mathematics are required with at least 6 units at the 200 level. Suggested courses are Math. 173, 205A,B,C, 224, 230, 236, 237, 256A,B,C, 274, 276A,B; Statistics 300A,B,C, 305, 306A,B, 310A,B,C. Other courses can be substitut-
ed with consent of the adviser and the SC/CM Committee. Students should take those courses most suitable to their areas of specialization.

2. **Numerical Analysis** (12 units): students are required to take Computer Science (CS) 237A, B, C and 3 units of one of the advanced courses in numerical analysis: CS 335, 336, 337, 339; Mechanical Engineering (ME) 233B, 235A, B, C; Statistics 327.

3. **Computer Science** (6-9 units): students can take a selection of courses from CS 109A, B, 212, 248, 260. This must include a course at the 200 level.

4. **Application Area** (9 units): students must take a focused program in an applications area such as fluid mechanics, operations research, or statistics. Courses must be at the 200 level or higher, and the program of concentration must be approved by the adviser and committee. The following courses meet the requirements: Aeronautics and Astronautics 210A, B, 214A, B, C; Civil Engineering 212; Electrical Engineering 363, 364, 365, 378A, B; ME 238A, B, 251A, B, 269.

5. **Seminar** (1 unit): students are required to regularly attend the Scientific Computing/Computational Mathematics seminar for one quarter. The seminar is held weekly during the academic year.

**DOCTOR OF PHILOSOPHY**

The University's basic requirements for the Ph.D. (residence, dissertation, examination, and so on.) are discussed in the "Graduate Degrees" section of this bulletin. The following are the program's requirements:

1. Plan and successfully complete a coherent program of study covering the basic areas of Scientific Computing and Computational Mathematics. It must at least satisfy the requirements for the M.S. degree in SC/CM. It is important that the student be able to exhibit depth in some area of application. The student's adviser has the primary responsibility for the adequacy of the program, which must meet the approval of the SC/CM Committee.

2. To be admitted to candidacy for the Ph.D. degree, a student must have successfully completed 27 units of graduate courses (200 level and above) with at least a GPA of 3.0. In addition, a student must pass a qualifying examination and give a presentation on his or her chosen research area. The qualifying examination must be taken within one year of admission into the Ph.D. program, and the research presentation must be completed within one year of successfully passing the Ph.D. qualifying examination. Detailed information about the scope of the Ph.D. qualifying examination may be obtained from the program.

3. Beyond the requirements for candidacy, the student must complete a focused course of study of at least 48 units. The program should be designed to develop a deep, focused background in the research area to be pursued in the dissertation. Approval of the program must be obtained from the SC/CM Committee.

4. In addition, the student must have an adequate knowledge of a coherent area of application and must complete at least 12 units in that area.

5. The most important requirement for the Ph.D. is the dissertation. Within a reasonable period after passing the qualifying examination, the student must obtain the agreement of a faculty member to be the dissertation adviser. A reading committee must be selected before the student is admitted to Terminal Graduate Registration (TGR), and this committee should be frequently consulted by the student before the University oral examination. Upon completion of a draft of the dissertation, the student must pass a University oral examination in defense of the dissertation.

**Ph.D. MINOR**

Students wishing to obtain a Ph.D. minor in the Scientific Computing and Computational Mathematics Program should consult the department office for designation of a minor adviser. A minor in SC/CM may be obtained by completing 20 units of course work, including the sequences Math. 220A, B, C and Computer Science 237A, B, C; these particular courses must be taken for a GPA of 3.0 (B) or better must be maintained.

The student's Ph.D. Reading Committee and University Oral Committee must include one faculty member who is associated with the SC/CM program.

**COURSES**

137. **Introduction to Scientific Computing**—(Enroll in Computer Science 137.) Prerequisites: Computer Science 106A; Math. 103 or 113 or equivalents.

4 units, Aut (Golub)
Spr (Lamba)
Sum (Staff)


220A. 3 units, Aut (Zhao)
220B. 3 units, Win (Papanicolaou)
220C. 3 units, Spr (Papanicolaou)

237A, B, C. **Advanced Numerical Analysis**—(Enroll in Computer Science 237A, B, C.)

237A. **Numerical Linear Algebra**—Prerequisites: Computer Science 106A, 137; Math. 103 or 113.

3 units, Aut (Golub)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Units</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>237B</td>
<td>Numerical Solution of Boundary Value Problems</td>
<td>Prerequisites: Math. 130, 131.</td>
<td>3</td>
<td>Win (Oliger)</td>
</tr>
<tr>
<td>237C</td>
<td>Numerical Solution of Initial Value Problems</td>
<td>Prerequisites: Math. 130, 131.</td>
<td>3</td>
<td>Win (Lamba)</td>
</tr>
<tr>
<td>331A</td>
<td>Continuum Mechanics: An Introduction</td>
<td></td>
<td>3</td>
<td>Aut (Stuart)</td>
</tr>
<tr>
<td>331B</td>
<td>Continuum Mechanics: Nonlinear and Inelastic Materials</td>
<td>(Enroll in Mechanical Engineering 238A.)</td>
<td>3</td>
<td>Spr (Pinsky)</td>
</tr>
<tr>
<td>336</td>
<td>Advanced Methods in Matrix Computation</td>
<td>(Enroll in Computer Science 336.)</td>
<td>3</td>
<td>Spr (Pinsky)</td>
</tr>
<tr>
<td>337</td>
<td>Numerical Methods for Initial Boundary Value Problems</td>
<td>(Enroll in Computer Science 337.)</td>
<td>3</td>
<td>Spr (Oliger)</td>
</tr>
<tr>
<td>338A</td>
<td>Dynamical Systems</td>
<td>(Enroll in Mechanical Engineering 233A.)</td>
<td>3</td>
<td>Staff given 1998-99</td>
</tr>
<tr>
<td>338B</td>
<td>Numerical Analysis of Dynamical Systems</td>
<td>(Enroll in Mechanical Engineering 233B.)</td>
<td>3</td>
<td>Staff given 1998-99</td>
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<tr>
<td>339</td>
<td>Topics in Numerical Analysis</td>
<td>(Enroll in Computer Science 339.)</td>
<td>3</td>
<td>1998-99</td>
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<tr>
<td>398</td>
<td>Curricular Practical Training</td>
<td>Provides students with on-the-job training</td>
<td>1</td>
<td>any quarter (Staff)</td>
</tr>
<tr>
<td>399</td>
<td>Independent Project</td>
<td></td>
<td></td>
<td>any quarter (Staff)</td>
</tr>
<tr>
<td>499</td>
<td>Advanced Reading and Research</td>
<td>Prerequisites: majoring in Scientific Computing and Computational Mathematics; consent of instructor.</td>
<td>1-3</td>
<td>any quarter (Staff)</td>
</tr>
<tr>
<td>530</td>
<td>Applied Mathematics/Scientific Computing Seminar</td>
<td></td>
<td>1-2</td>
<td>Aut, Win, Spr (Staff)</td>
</tr>
<tr>
<td>531</td>
<td>Numerical Analysis/Scientific Computing Seminar</td>
<td></td>
<td>1-2</td>
<td>Aut, Win, Spr (Staff)</td>
</tr>
</tbody>
</table>
SCHOOL OF HUMANITIES AND SCIENCES

Dean: John B. Shoven
Associate Deans: Hans C. Anderson, Stephen H. Haber, David Holloway, Ramon Saldivar
Associate Dean for Development: Robert Franklin
Associate Dean for Finance: Nancy J. Padgett
Assistant Deans: Judith Cain, Roni Holeton, Stephanie Kalfayan, Geneva Lopez, JoanMinor, Ellen Woods

Department Chairs: Russell Herman (German Studies), Blas Cabrera (Physics), Gunner E. Carlsson (Mathematics), Stephen Chaffee (Communication), Frederick Dretske (Philosophy), Bill Durham (Anthropology), Arnold M. Eisen (Religious Studies), Ralph Hester (French and Italian), Aharon Kapatulnik (Applied Physics), Charles R. Lyons (Drama), Norman M. Naimark (History), Stanley Peters (Linguistics), Dennis A. Powers (Hopkins Marine Station), Mary L. Pratt (Spanish and Portuguese), Richard Schupbach (Slavic Languages and Literatures), David Siegmund, (Statistics), Claude Steele (Psychology), Barry Trost (Chemistry), Nancy Tuma (Sociology), Richard E. Vinograd (Art), Barry R. Weingast (Political Science)

The School of Humanities and Sciences, with over 40 departments and interdepartmental degree programs, is the primary locus for the superior liberal arts education offered by Stanford University. Through exposure to the humanities, undergraduates study the ethical, aesthetic, and intellectual dimensions of the human experience, past and present, and so are prepared to make thoughtful and imaginative contributions to the culture of the future. Through the study of social, political, and economic events, they acquire theories and techniques for the analysis of specific societal issues, as well as general cross-cultural perspectives on the human condition. And through exposure to the methods and discoveries of mathematics and the sciences, they will become better-informed participants and leaders in today's increasingly technological societies.

Further, the exciting research environment within the school offers both undergraduates and graduate students the intellectual adventure of working on their own research projects side by side with the school's distinguished faculty. While a few of the school's graduate programs offer professional degrees such as the Master of Fine Arts, most are academic and research programs leading to the Ph.D. Doctoral programs emphasize original scholarly work by the graduate students, often at the frontiers of knowledge, and normally require the students to participate in the supervised teaching of undergraduates. Indeed, in the school, as in the University more broadly, graduate students are of central importance in developing a community of scholars.

The fact that so many different disciplines lie within the same organization is one reason why the school has had great success in promoting interdisciplinary teaching and research programs. Whether engaged in studies as wide ranging as ethics, policy, and technological issues, or by applying contemporary social and philosophical theories to classical literature, our undergraduates, graduate students, and faculty are challenging the barriers among scholarly disciplines. The school will continue to strive for a balance between teaching and research, the academy and society.

ORGANIZATION

The School of Humanities and Sciences includes the Departments of Anthropology, Applied Physics, Art, Asian Languages, Biological Sciences (and the Hopkins Marine Station), Chemistry, Classics, Communication, Comparative Literature, Drama, Economics, English, Food Research, French and Italian, German Studies, History, Linguistics, Mathematics, Music, Philosophy, Physics, Political Science, Psychology, Religious Studies, Slavic Languages and Literatures, Sociology, Spanish and Portuguese, and Statistics.


In addition, the school sponsors programs that do not currently grant degrees: African Studies, Astronomy, Black Performing Arts, Ethics in Society, History and Philosophy of Science, Jewish Studies, Medieval Studies, Overseas Studies, and Undergraduate Research Opportunities.

Faculty and academic staff of the School of Humanities and Sciences are listed under the respective departments or programs.

DEGREES OFFERED

Candidates for the degree of Bachelor of Arts, Bachelor of Science, Bachelor of Arts and Sciences, Master of Arts, Master of Fine Arts, Master of Science, Doctor of Musical Arts, or Doctor of Philosophy should consult appropriate sections of the announcements following. They
should consult also the department or program in which they intend to specialize.

UNDERGRADUATE PROGRAM IN AFRICAN AND AFRO-AMERICAN STUDIES

Acting Director: Morris Graves
Advisory Committee: David Abernethy (Political Science), Ryan Bathe (African and Afro-American Studies), Earl Black (African and Afro-American Studies), Cristale G. Brown (History), Clay Carson (History), Sally Dickson (Multicultural Development Office), Sandra Drake (English), Michael Thompson (History), John Rickford (Linguistics)

UNDERGRADUATE PROGRAM
BACHELOR OF ARTS

The African and Afro-American Studies (AAAS) program covers a vast and varied field, including: (I) the history, literature, culture and social science of African Americans as a central component of American culture; and (II) the history, literature, culture, and social science of the peoples of Africa and the Black Diaspora. AAAS is an indispensable subject for those interested in the historical, cultural, social, economic, or political study of the United States.

To investigate the rich and varied human tapestry which AAAS spans, students are encouraged to use interdisciplinary methods drawn from anthropology, art, art history, economics, languages, linguistics and literature, music, philosophy, political science, psychology, religion, and sociology, among others. A degree in AAAS prepares students for the many work positions requiring a broad liberal arts perspective as well as those requiring the specialized knowledge which AAAS offers. Students in AAAS receive training that is especially valuable for graduate study and/or careers in such fields as education, journalism, law, business, urban studies, medicine, politics, creative writing, comparative literature, linguistics, the social sciences, social work, and the performing arts. The program emphasizes creative scholarship and research through various means, as follows.

PROGRAM REQUIREMENTS

Starting in Autumn Quarter 1997, all majors and double majors are expected to complete a total of 60 units, of which 25 units must be selected from the AAAS core courses (AAAS 105 is mandatory). Students must also enroll in two (2) Comparative Studies in Race and Ethnicity (CSRE) core introductory courses and complete a CSRE senior seminar (a writing intensive course of 5 units) before graduating. Additionally, 20 units are to be selected from areas I (Afro-American Studies) or II (Africa and the Black Diaspora) or a special program, area III, devised by the student. Honors students should choose option III. All majors must include at least one course from area I and II. Each of these options consolidates as well as broadens the work of the core. Students who choose option III may devise a program with a special theme. This choice allows the student to focus 20 units on developing previous work in the major or exploring new areas. In organizing this plan, the student works with an adviser on the chosen theme and must have prior written approval from the director of the program.

CORE COURSES

(25 units)

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAAS 105, Introduction to African and Afro-American Studies</td>
<td>5</td>
</tr>
<tr>
<td>English 161C, 20th-Century Afro-American Fiction</td>
<td>5</td>
</tr>
<tr>
<td>English 168B, Introduction to African-American Literature</td>
<td>5</td>
</tr>
<tr>
<td>History 148, Introduction to African History</td>
<td>5</td>
</tr>
<tr>
<td>History 164, Race and Ethnicity in American Experience</td>
<td>5</td>
</tr>
<tr>
<td>Linguistics 73, African-American Vernacular English</td>
<td>4</td>
</tr>
<tr>
<td>Political Sciences 118A, Political Change in Tropical Africa</td>
<td>5</td>
</tr>
<tr>
<td>Political Sciences 118B, The Politics of Race and Class in Southern Africa</td>
<td>5</td>
</tr>
<tr>
<td>Political Sciences 181, African-Americans and the Political System</td>
<td>5</td>
</tr>
</tbody>
</table>

(I) AFRO-AMERICAN HISTORY, LITERATURE, CULTURE, AND SOCIETY

Option I majors choose 20 units.

AAAS

105, Introduction to African and Afro-American Studies (required)

SOCIAL SCIENCE

Option I minors must choose at least two courses below.

Education:
93C, Peer Counseling
179X, Urban Youth and their Institutions

Anthropology:
9, Encounters: The Anthropology of Contact and Conflict

Economics:
116, American Economic History

Linguistics:
73, African American Vernacular English
150. Introduction to Sociolinguistics
153. Inter-and Intra-Ethnic Variations in Urban Vernacular English

Overseas Studies—Oxford:
111X. Race and Ethnicity in Modern Britain

Political Science:
181. African Americans and the Political System
196. Issues of Race in American Politics
296. Seminar: Racial and Ethnic Politics in the U.S.

Psychology:
127. African American Psychology
175. Seminar on Topics in Identity Development

Sociology:
140. Introduction to Social Stratification
145. Race and Ethnic Relations
147. Women of Color: The Intersection of Race, “Ethnicity,” “Class,” and Gender
149. The Urban Underclass

HUMANITIES
Option I minors must choose at least two courses below.

Classics:
105. The History and Culture of Ancient Egypt

Drama:
155. Black Drama
163. Performance and America

English:
161A. African-American Writing, 1950-1970
161C. 20th-Century Afro-American Fiction
163J. 19th- and 20th-Century African American Writers
187T. Seminar: Contexts of African American Intellectual History

History:
58S. Introductory Seminar: Women in the Modern African American Freedom Struggle
157. Introduction to African American History: The Modern Black Freedom Struggle
164. Introduction to Race and Ethnicity in the American Experience
200M. Undergraduate Directed Research: Martin Luther King, Jr. Papers Project
249. Undergraduate Colloquium: Religions, Cultures, and History in West Africa and the African Americans
259. Undergraduate Colloquium: Black and White in the United States and South Africa
264S. Undergraduate Research Seminar: The Papers of Martin Luther King, Jr. and the Modern Civil Rights Movement

Music:
18. Jazz History
18A. Ragtime to Bebop (1900-1945)
18B. Bebop to Present (1945)
20A. Jazz Theory
20B. Advanced Jazz Theory

Overseas Studies—Paris:

Philosophy:
177. Anti-Racism, Multiculturalism, and Common Humanity

Religious Studies:
163. Religion and Ethnicity
276. Topics in Race and Religion

Spanish and Portuguese:
175E. Literature of Struggle as a Discourse for Freedom in Lusophone Africa

(II) AFRICAN HISTORY, CULTURE, AND SOCIETY: HISTORY, CULTURE, AND SOCIETY OF THE BLACK DIASPORA

Option II majors choose 20 units.

AAAS
105. Introduction to African and Afro-American Studies (required)

SOCIAL SCIENCE
Option II minors must choose at least two courses below.

Anthropology:
108B. Africa: Gender and Representation

Political Science:
118 A. Political Change in Tropical Africa
118B. The Politics of Race and Class in Southern Africa

HUMANITIES
Option II minors must choose at least two courses below.

French and Italian:
133. Literature and Society in Africa and the Caribbean
170E. Introduction to African Systems of Thought
278. Topics in French and Francophone Literature: The Discourse of (Self) Representation

History:
148. Introduction to African History
148C. Africa in the 20th Century
149. Africa since 1935
149A. East Africa in History
246A. Undergraduate Colloquium: African History and African Novel
246B. Undergraduate Colloquium: Mau Mau Uprising in 1950s Kenya
246S. Undergraduate Research Seminar: East Africa in Transition 1880s-1920s
247. Greater East Africa and its Historical Writing (same as 347)
247A. Undergraduate Colloquium: African Identity in a Changing World
247S. Undergraduate Research Seminar: Fieldwork in Africa Oral History, Life, and Family History
248. Undergraduate Colloquium: Popular Culture in Africa
248A. End of Slavery: Africa and the Americas
248D. Law and Colonialism in Africa
248S. Undergraduate Research Seminar: Colonial States and Societies in Africa
249. Undergraduate Colloquium: Religions, Cultures, and History in West Africa and the African Americans
249B. Everyday Life in Contemporary Africa
259. Undergraduate Colloquium: Black and White in the United States and South Africa

MINORS
Students who minor in AAAS must choose either Option I or II and complete a total of six courses of 3 or more graded units, including two courses from the social sciences, at least two from...
the humanities and one elective, all from their chosen option. All AAAS students must complete AAAS 105. Students must develop a coherent theme in their course selections, in consultation with the program director.

AAAS stresses academic advising. The chair advises all AAAS students, including majors, minors and double majors. Their progress is also closely followed by the program coordinator. Additionally, majors and double majors have the opportunity to participate in individual and group mentoring activities offered by CSRE. The program prides itself on its responsiveness to student concerns, and its guiding Advisory Committee includes both faculty and student representation.

HONORS

Majors who have maintained a cumulative 3.3 GPA or higher may apply for the honors program. The honors essay or project is intended to enable students to synthesize several of the skills they have acquired and to produce a document or project demonstrating some measure of competence in their specialty. The honor’s project essay must be discussed with and approved by the major adviser and the program director.

UNDERGRADUATE SCHOLARS PROGRAM (USP)

USP is an innovative project that brings together faculty and students for research on an intensive, individual basis. Each student receives a research stipend and a certificate on completing the program. USP is listed as a specific course (AAAS 198A, 3-5 units), Winter and Spring Quarters on the student’s transcript. A video describing the program in more detail is available for interested applicants.

DIRECTED READING

Directed reading allows students to focus up to 15 units of work on a special topic of interest. In organizing this plan, the student consults with the program director and one or more faculty members specializing in the area or discipline.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.


190A,B,C. Directed Reading
1-15 units, Aut, Win, Spr (Staff)

198A. The Undergraduate Scholars Program
3-5 units, Spr (Jackson)

199A,B,C. Honors Project
1-10 units, Aut, Win, Spr (Staff)

AFFILIATED DEPARTMENT OFFERINGS

See respective department listings for course descriptions and General Education Requirements (GER) information.

DRAMA

163. Performance and America—(WIM) 4 units, Aut (Elam)

DANCE

43. Afro-Brazilian and Afro-Peruvian Dance 1 unit, Aut (Cashion)

44. Jazz Dance I 1 unit, Aut, Win, Spr (Kramer)

143. African-American Roots of American Concert Dance 2 units, Win (Moses)

144. Jazz Dance II 1 unit, Aut, Spr (Moses)

ENGLISH

161A. Afro-American Writing, 1950-1970 5 units, Spr (Drake)

161H. Narration, Detection, and Social Marginality 5 units, Spr (Drake)

162G. Writing by 20th-Century Women of Color 5 units, Win (Moya)

187N. Seminar: Afro-American Autobiography 5 units, Aut (Porter)

308K. Slavery and American Fiction: Representation and American Fiction 4-5 units, Aut (Porter)

HISTORY

48Q. Stanford Introductory Seminar: South Africa—Contested Transitions 3 units, Win (Samoff)

49Q. Stanford Introductory Seminar: Everyday Life in Africa 5 units, Spr (Jakson, Leben)

61. The Constitution and Race 5 units, Spr (Rakove)
AFRICAN STUDIES 281

50S. Sources and Methods Seminar: Race and Popular Culture (in Black and White) 5 units, Spr (Thompson)

147A. African History in Novels and Film 5 units, Win (Jackson)

147B. The Idea of Africa among African Americans 5 units, Spr (Jackson)

148C. Africa in the 20th Century 5 units, Spr (R. Roberts)

150. African-American History: From African Origins to American Emancipation and Beyond 5 units, Win (M. Thompson)

157. Introduction to African-American History: The Modern Black Freedom Struggle 5 units, Spr (Carson)

164. Introduction to Race and Ethnicity in the American Experience 5 units, Spr (Camarillo, Fredrickson)

200M. Undergraduate Directed Research: Martin Luther King, Jr. Papers Project units by arrangement (Carson)

246B. Undergraduate Colloquium: The Great Mau Mau Rebellion in 1950s Kenya—(Same as 346B.) 5 units, Win (Jackson)

247. Greater East Africa and its Historical Writing—(Same as 347.) 5 units, Aut (Jackson)

248A. Undergraduate Colloquium: The End of Slavery in Africa and the Americas 5 units, Win (Roberts)

253. Undergraduate Colloquium: Topics in African American History—The Great Migration 5 units, Spr (Thompson)

255A. Undergraduate Colloquium: Culture and Ideologies of Race 5 units, Aut (Thompson)

259. Undergraduate Colloquium: Race and Ethnicity in the United States and South Africa 5 units, Aut (Fredrickson)

269. Undergraduate Colloquium: The African-American Community Organizing Tradition 5 units, Aut (Carson)

LINGUISTICS

73. African American Vernacular English 4 units, Win (Baugh)

150. Language in Society—(WIM) 4-6 units, Spr (Schilling-Estes)

MUSIC

18. Jazz History

18B. Bebop to Present (1940-) 3 units, Aut (Berry)

20A. Jazz Theory 3 units, Win (Nadel)

118B. The Struggle Continues: Jazz, Culture, and Society 3 units, Win (McMichael)

161B. Jazz Ensemble 1 unit, Win, Spr (Berry)

POLITICAL SCIENCE

118A. Political Change in Tropical Africa 5 units, Spr (Abernethy)

181. African Americans and the Political System 5 units, Spr (Harris)

PSYCHOLOGY

10. Introduction to Statistical Methods 5 units, Aut (Walther)

Win (Sen)

Spr (Thomas)

174. African American Psychology 3 units, Spr (McCants)

175. Seminar on Topics in Identity Development 3 units, Win (McCants)

AFRICAN STUDIES

Emeriti: Paul F. Basch (Medicine), James L. Gibbs, Jr., Raymond D. Giraud, Carl Gotsch, Joseph H. Greenberg, Bruce F. Johnston, Hans N. Weiler, Sylvia Wynter

Chair: Richard Roberts

Professors: David B. Abernethy (Political Science), Jean-Marie Apostolidès (French and Italian), Russell Berman (Comparative Literature), Joan Bresnan (Linguistics), Martin Carnoy (Education), Walter P. Falcon (Food Research Institute), George M. Fredrickson (History), William B. Gould (Law, on leave), William R. Leben (Linguistics), Valentin Mudimbe (French and Italian, and Comparative Literature), Scott R. Pearson (Food Research Institute), Richard Randell (Art), Richard Roberts (History), Pan A. Yotopoulos (Food Research Institute)

Associate Professors: Sandra E. Drake (English and Comparative Literature), Kennell A. Jackson, Jr. (History), Bruce Lusignan (Electrical Engineering), Elisabeth Mudimbe-Boyi (French and Italian, and Comparative Literature), Horace A. Porter (English, and African and Afro-American Studies)

Assistant Professors: Paulla A. Ebron (Anthropology), Marcel Fafchamps (Economics), Akhil Gupta (Anthropology), David Katzenstein (School of Medicine), Karen Mundy (School of Education), Frederic Zimmerman (Food Research Institute)

Senior Lecturer: Khalil Barhoum (Linguistics)
2. Interdepartmental majors, such as African and Middle Eastern Studies, focus among several alternatives: graduate students can specialize in African Studies. They can also take courses offered by the Language Center to offer instruction in other African languages. In recent years, the Special Language Program has offered courses in Fulani, Hausa, Maninka, Northern Sotho, Shona, Swahili, and Wolof.

Along with regular courses in several levels of Swahili and Arabic, the committee arranges with the Stanford/Berkeley Joint Center for African Studies, it is possible to incorporate courses from both institutions into one's program. Contact the center at (650) 723-0295 for a listing of courses offered at University of California at Berkeley.

Courses in African Studies are offered by departments and programs throughout the University. A sampling of these is listed at the end of this section. Each year the committee sponsors a seminar to demonstrate to advanced undergraduate and graduate students how topics of current interest in African Studies are approached from different disciplinary perspectives. Each week's presentation is conducted by a different professor in African Studies; the first hour is a lecture, followed by a one-hour seminar discussion.

Course offerings in African languages are also coordinated by the Committee on African Studies. Along with regular courses in several levels of Swahili and Arabic, the committee arranges with the Special Language Program in the Stanford Language Center to offer instruction in other African languages. In recent years, the Special Language Program has offered courses in Fulani, Hausa, Maninka, Northern Sotho, Shona, Swahili, and Wolof.

The Committee on African Studies does not sponsor degree programs, but undergraduates and graduate students can specialize in African Studies under a number of arrangements listed below.

**UNDERGRADUATE STUDY**

Undergraduates may choose an African Studies focus among several alternatives:

1. A major in a traditionally defined academic department (for example, Anthropology, History, Political Science, and so on). These departments afford ample opportunity to enroll in courses outside the major, leaving the student free to pursue the interdisciplinary study of Africa.

2. Interdepartmental majors, such as African and Afro-American Studies or International Relations, which offer coordinated and comprehensive interdisciplinary course sequences, permitting a concentration in African Studies.

3. An individually designed major in African Studies. Under the supervision of a faculty adviser and two other faculty members, the student can plan a program of study focused on Africa that draws courses from any department or school in the University. If approved by the Dean’s Advisory Committee on Individually Designed Majors, the program becomes the curriculum for the A.B. degree.

Undergraduates can study for a year in Africa. In recent years, students have been able to enroll at the University of Nairobi, Kenya, and at Université du Benin, Togo. Students should check with the Overseas Studies office to see what arrangements are currently available.

The Committee on African Studies awards a minor in African Studies. Students majoring in any field qualify for this minor by meeting the following requirements:

1. Taking at least 25 units of courses with “significant African content” (at least one course should be a survey course).

2. Designating a focus of study (an academic discipline, a region of Africa, or a topical theme).

3. Attaining competence in a language other than English that is spoken in Africa (minimum of three quarters in one African language or the equivalent of six quarters of French, Arabic, or Portuguese).

4. Writing a research paper (normally an extension of a term paper written for an African Studies course).

Upon satisfactory completion of all requirements, final certification of the minor will be made by the Center for African Studies and will appear on the student’s transcript. For more information, call the Center for African Studies at (650) 723-0295.

**GRADUATE STUDY**

For those who wish to become specialists in African Studies at the graduate level, African Studies can be designated a field of concentration within the regular master’s and doctoral programs of some academic departments. Students in the departments of Anthropology, History, Political Science, and Sociology, and in the School of Education, may declare African Studies as the area of specialization for their master’s and Ph.D. thesis work. Some other departments, programs, and institutes such as International Policy Studies and the Stanford International Development Education Committee also permit students to specialize in African Studies. U.S. citizens and permanent residents who are interested in area language studies in Africa may request a Foreign Language...
and Area Studies (FLAS) Fellowship application from the FLAS Fellowships Coordinator at (650) 723-8327. The FLAS application deadline is mid-January.

COURSES

249B. Everyday Life in Contemporary Africa—Often, our understanding of today’s Africa is in an outdated framework. What is the experience of lived history in contemporary Africa? Themes: the culture of communication (language, film, radio, TV, records); the citizen and the state; women and men; the culture of money, success, and poverty; and today’s rural and urban life. Aim is to locate the ordinary people on a grid of choices and outcomes.

5 units (Jackson, Leben) not given 1997-98


5 units (R. Roberts) not given 1997-98

AFFILIATED DEPARTMENT OFFERINGS

See respective department listings for course descriptions and General Education Requirements (GER) information.

AFRICAN AND AFRO-AMERICAN STUDIES

105. Introduction to African and Afro-American Studies
5 units (Staff)

ANTHROPOLOGY

6. Human Origins—(Same as Human Biology 6.)

5 units, Win (Klein)

11C. Gender in Cross-Cultural Perspective
5 units (Ebron) not given 1997-98

108B. Africa: Gender and Representation
5 units (Ebron) not given 1997-98

133A,B,C. Ethics of Development in a Global Environment (EDGE)—(Same as Engineering 297A,B,C.)

1-4 units, Aut, Win, Spr (Gupta, Lusignan)

151A. Comparative Cultural Studies
5 units (Ebron) not given 1997-98

151B. Theories of Race and Ethnicity: A Comparative Perspective
5 units, Win (Yanagisako)

242. Reading Theory through Ethnography
5 units (Ebron) not given 1997-98

243. Culture as Commodity
5 units, Aut (Ebron)

262. Topics in Political Economy
5 units (Gupta) not given 1997-98

DRAMA

DANCE

43. Afro-Brazilian and Afro-Peruvian Dance
1 unit, Aut (Cashion)

143. African-American Roots of American Concert Dance
2 units, Win (Moses)

EDUCATION

202X. Introduction to Comparative and International Education
4-5 units, Aut (Mundy, Carnoy, Ramirez)

207. Seminar: The Politics of International Cooperation in Education
3-4 units, Win (Mundy)

306B. Education and Political Change
4-5 units, Spr (Mundy)

FOOD RESEARCH

103. The World Food Economy
5 units, Win (Falcon, Naylor)

119. Development and Population Interactions in the Third World
5 units, Win (Yotopoulos) given 1998-99

FRENCH AND ITALIAN

133. Literature and Society: Introduction to Francophone Literature from Africa and the Caribbean
4 units, Win (Mudimbe-Boyi)

278E. Topics in French and Francophone Literature: Discourses on Self-Representation
3-5 units, Spr (Mudimbe-Boyi)

HISTORY

48Q. Stanford Introductory Seminar: South Africa—Contested Transitions
3 units, Win (Samoff)

147A. African History in Novels and Films
5 units, Win (Jackson)

147B. The Idea of Africa among African Americans
5 units, Spr (Jackson)

148. Introduction to African History
5 units (Jackson) not given 1997-98

148C. Africa in the 20th Century
5 units, Spr (R. Roberts)

150. African-American History: From African Origins to Emancipation and Beyond
5 units, Win (Thompson)
246B/346B. The Great Mau Mau Rebellion in 1950s Kenya
5 units, Win (Jackson)

247/347. Greater East Africa and its Historical Writing
5 units, Aut (Jackson)

247A. Undergraduate Colloquium: African Identities in a Changing World
5 units (R. Roberts) not given 1997-98

248/348. Popular Culture in Africa
5 units (Jackson) not given 1997-98

248A/348A. The End of Slavery in Africa and the Americas
5 units, Win (R. Roberts)

248D/348D. Law and Colonialism in Africa
4-5 units (Roberts) not given 1997-98

248S/448A. Colonial States and Societies in Africa
5 units (R. Roberts) not given 1997-98

249A/349A. The Issue of Greatness in Black History
5 units (Jackson) not given 1997-98

259/359. Race and Ethnicity in the United States and South Africa
4-5 units, Aut (G. Frederickson)

306B. Design and Methodology for International Field Research
1 unit, Win (R. Roberts, Kollman, Duus)

347B. Graduate Colloquium in African History: The Colonial Africa
4-5 units, Win (R. Roberts)

349. Graduate Core Colloquium: Precolonial Africa
4-5 units (R. Roberts) not given 1997-98

LANGUAGE CENTER
SPECIAL LANGUAGE PROGRAM

106A,B,C. Beginning Swahili
106A. 4 units, Aut (Mugane)
106B. 4 units, Win (Mugane)
106C. 4 units, Spr (Mugane)

107A,B,C. Intermediate Swahili
107A. 3 units, Aut (Mugane)
107B. 3 units, Win (Mugane)
107C. 3 units, Spr (Mugane)

108A,B,C. Advanced Swahili
108A. 3 units, Aut (Mugane)
108B. 3 units, Win (Mugane)
108C. 3 units, Spr (Mugane)

120A,B,C. Beginning Arabic
120A. 4 units, Aut (Barhoum)
120B. 4 units, Win (Barhoum)
120C. 4 units, Spr (Barhoum)

121A,B,C. Intermediate Arabic
121A. 4 units, Aut (Barhoum)

POLITICAL SCIENCE

25. Colonialism and Nationalism in the Third World
5 units (Abernethy) given 1998-99

116L. Social Foundations of Democracy
5 units (Diamond) given 1998-1999

118A. Political Change in Tropical Africa
5 units, Spr (Abernethy)

118B. The Politics of Race and Class in Southern Africa
5 units (Abernethy) alternate years, given 1998-99

AMERICAN STUDIES

Administrative Committee: (Chair) Barton J. Bernstein (History); Rudy Busto (Religious Studies, on leave), Albert Camarillo (History), Gordon Chang (History), Joseph Corn (American Studies Program Coordinator, on leave), Wanda Corn (Art, on leave), Jay Fliegelman (English, on leave), George Fredrickson (History), Richard Gillam (American Studies Program Coordinator), Judith Goldstein (Political Science), Alexander Nemerov (Art), Horace A. Porter (English, and African and Afro-American Studies), Jack Rakove (History), Karen Sawislak (History), William Solomon (English, on leave), Mark S. Weiner (American Studies), Gavin Wright (Economics)

The American Studies program is administered through the office of Humanities Special Programs.

UNDERGRADUATE PROGRAMS
BACHELOR OF ARTS

The purpose of the American Studies program is to provide students with a comprehensive and critical interdisciplinary understanding of the American experience. The program builds on a series of core courses emphasizing intellectual and cultural as well as historical and legal analysis. American Studies is also a broadly multicultural major that gives serious curricular attention to issues of diversity, especially as raised by distinctions of race, class, ethnicity, and gender. All majors take an intensive seminar, "Perspectives on American Identity," that explores the tension
between commonality and difference, and society and group, from a variety of disciplinary perspectives. The program stresses the study of multiculturalism in depth as well as breadth by requiring students to take at least two approved classes focusing specifically on race and ethnicity. Majors who take five or more such courses have the option of graduating with a race and ethnicity specialization in American Studies.

All American Studies majors work closely with a faculty coordinator to develop an independent study plan consisting of 14 (or more) courses totaling at least 60 units. All are to be taken for a letter grade. Study plans must emphasize one of four general concentrations or areas of interest (History and Society, Literature and Thought, Visual and Material Culture, and Politics, Policy, and Economics).

Concentration Requirements—All majors must take a total of 11 courses in four areas of concentration: (1) History and Society; 2) Literature and Thought; (3) Visual and Material Culture; and (4) Politics, Policy, and Economics. These 11 courses, in all cases, include American Studies 150, History 165A, and History 165B, plus courses to satisfy the race and ethnicity requirement (described in the section below). In addition, majors must meet the following minimum distribution requirements: five courses sufficient to provide a solid grounding in a chosen area of concentration; six courses in the other three areas; and at least one course in each area. Students who formally declared American Studies as their major before September 1, 1996 have the option of fulfilling the requirements listed here, or completing the requirements in effect at the time of declaration.

Seminar Requirements—All majors must take American Studies 200, Perspectives on American Identity, plus a second seminar (or colloquium) requiring a substantial paper. Neither American Studies 200 nor the second seminar count towards the 11-course concentration requirement described above. However, students who complete more than these two required seminars may count such additional seminars towards their 11-course concentration requirement. Most courses that fulfill the second seminar requirement are noted in the updated list available at the program office. There may be other courses that fulfill this requirement; students should consult the chair or one of the program coordinators in such cases. Seminars taken under the aegis of the Stanford-in-Washington Program may also fulfill the second seminar requirement.

Race and Ethnicity Component—This requirement may be fulfilled in one of the following two ways:

1. Normally, students take American Studies 164, Race and Ethnicity in the American Experience, and a second race and ethnicity course approved by the program. In this case, the second race and ethnicity course counts towards the 11-course concentration requirement.

2. Alternatively, students may take three approved race and ethnicity classes dealing with at least two different racial/ethnic groups. In this option, two of these three courses count towards the 11-course concentration requirement.

A list of courses satisfying the race and ethnicity component in American Studies may be obtained from the program administrator.

Optional Specialization in Race and Ethnicity—Students who take at least five approved race and ethnicity courses graduate with an American Studies specialization in race and ethnicity. This is noted on the final undergraduate transcript.

MINORS

Students wishing to earn an undergraduate minor in American Studies must complete seven courses for a minimum of 27 units.

All students take the program’s core course, American Studies 150/English 121, American Literature and Culture to 1855 (5 units), as an introduction to the critical study of American literature and culture.

Students also complete two of the following five courses in American history (10 units) to provide a historical foundation:

- American Studies 164/History 164, Race and Ethnicity in the American Experience
- History 165A. Colonial and Revolutionary America
- History 165B. 19th-Century America
- History 165C. The United States in the 20th Century
- History 172A. America since 1945

Additionally, students choose four elective courses appropriate to their particular interests from courses listed under American Studies (12-20 units). These courses should be selected with one of two goals in mind: to give the student a breadth of exposure to various issues in American Studies; and to give the student an opportunity to study an area of American Studies in depth (for example, arts and letters, history, social institutions, policy) or to focus on a particular issue in American Studies (for example, technology in America, race and ethnicity in America, American art and material culture).

All courses counted toward the minor in American Studies must be taken for a letter grade. No course counted toward the minor can also count toward a student’s major.

HONORS PROGRAM

Preferably during the junior year and no later than the third quarter before graduation, majors with demonstrated interest and ability in American Studies may apply to seek honors by writing a senior thesis for 10 to 15 units of credit. This application is to include the topic and a proposed
outline of the senior thesis and should be signed by a Stanford faculty member who is willing to direct the student's thesis during the ensuing year. The program may approve the application or request resubmission with revisions. The finished essay must be submitted six weeks before the date of graduation. Units for the honors project must be in addition to the 60-unit major. The final grade for the essay is assigned by the chair based on the evaluations of both the primary thesis adviser and a second reader appointed by the program.

AMERICAN STUDIES HOUSE

This undergraduate residence in Governor's Corner offers educational opportunities in American Studies to majors whether they are residents or not. Residents are assigned through the draw for undergraduate housing.

COURSES

See departmental listings for fuller descriptions and University General Education Requirements (GER) notations. Some courses may require prerequisites that do not apply toward the major. See the Time Schedule each quarter for changes in listings. An up-to-date list is available in the program office.

CORE

AMERICAN STUDIES

150. American Literature and Culture to 1855—(Same as English 121.) Required for the American Studies major. Detailed study of important representative works of American culture from 1630 to 1855. Textual readings are supplemented with discussions of the intellectual, theological, and political history of the period. (Literature and Thought).
5 units, Win (Luria)

151. The Transformation of American Thought and Culture, 1865 to the Present—Persistent strains and tensions in American intellectual life and culture over the past century and a quarter. Readings include autobiographies, novels, documentary works, and historical and theoretical analyses that bear on issues of technology and culture, consumerism, mass society, gender, sexuality, violence, political extremism, and power. (History and Society or Literature and Thought) GER:3a (DR:7) (WIM)
5 units, Win (Gillam)

152. American Spaces: Introduction to Material Culture and the Built Environment—(Same as History 152.) American history through the evidence of things, e.g., spaces, buildings, and landscapes of the “built environment.” How to “read” such artifacts using methods and theories from anthropology, cultural geography, history, and other disciplines. (Visual and Material Culture)
5 units (J. Corn) given 1998-99

179. Introduction to American Law—(Same as Law 106, Political Science 182F.) American law for undergraduates. The structure of the American legal system, including the courts; American legal culture; the legal profession and its social role; the scope and reach of the legal system; the background and impact of legal regulation; the relationship between the American legal system and American society in general. (History and Society; or Politics, Policy, and Economics) (GER:3b) (DR:9)
5 units, Aut (Friedman)

RACE AND ETHNICITY

Note—Students must take a second course in Race and Ethnicity besides 164, selected from the list available in the program office. This second course counts in one of the concentrations.

164. Introduction to Race and Ethnicity in the American Experience—(Same as History 164.) (Fulfills Race and Ethnicity Requirement; does not count toward concentration). How and ethnicity influenced the American experience and how prevailing attitudes about racial and ethnic groups over time have affected the historical and contemporary reality of the nation’s major minority populations. Focuses on the past two centuries. GER:4b (DR:3)
5 units, Spr (Fredrickson, Camarillo)

SEMINAR ON PERSPECTIVES ON AMERICAN IDENTITY

200. Perspectives on American Identity—Required for American Studies major. Analysis of changing interpretations of American character and “Americanness” since the 17th century. GER:3a (DR:7) (WIM)
5 units, Spr (Gillam)

HISTORY AND SOCIETY

120. The Process and Practice of Community Service—The values, traditions, policies, and politics of community service. Topics: social responsibility, altruism vs. obligation, servant leadership, community development, civic education and democratic citizenship, professional and voluntary service. Concurrent participation in community service required.
4 units, Win (Stanton)

151. The Transformation of American Thought and Culture, 1865 to the Present—See “Core Lectures.”

179. Introduction to American Law—See “Core Lectures.”

214. The American 1960s: Thought, Protest, and Culture—The meaning of the American 1960s, emphasizing ideas, culture, protest, and the “new sensibility” that emerged during this decade of transition. Topics: black protest, the new left, the counterculture, feminism, the new literature and
journalism of the 1960s, the role of the media in shaping dissent, and the legacy of 1960s protest. Interpretive materials from film, music, articles, and books. GER:3a,4b (DR:3 or 7)

5 units, Aut (Gillam)

215. Multi-Culturalism in American Law—How has the United States legal system contended with the issues raised by ethnic conflict, cultural diversity, and normative pluralism? Seminar considers these questions from contemporary and historical perspectives, introducing students to how that study of law can broaden their understanding of American society and the American past.

5 units, Spr (Weiner)

216. Major Trials in African-American History—Seminar. The historical significance of prominent legal cases concerning African-Americans from the colonial period to the present. Students consider the specific legal aspects of the cases at issue to understand their importance as documents of American cultural history. Cases: Armistad, Dred Scott, Plessy, Scottsboro, Brown, O. J. Simpson, Mumia Abujamal, and literary and film images of African-Americans on trial.

5 units, Win (Weiner)

ANTHROPOLOGY

110. Introduction to the Chicano Life and Culture

168. Medical Anthropology

COMMUNICATION

131. Media Ethics and Responsibility

EDUCATION

105. American Education and Public Policy—(Same as History 158B.)

201. History of Education in the United States—(Same as History 158.)

HISTORY

28. The Second World War

51N. Stanford Introductory Seminar: Abraham Lincoln—Myth and Reality

53N. Stanford Introductory Seminar: Reflections on the American Condition—American History through Literature

54S. Sources and Methods: Narrating Nature: American Environmental History

61. The Constitution and Race

67S. Sources and Methods: Social Change in Industrializing America—A Case Study of Chicago

73S. Sources and Methods Seminar: When Women Arrived—Gender, Race, and Citizenship in the United States

75. The United States and East Asia

150. African-American History—African Origins to American Emancipation and Beyond


159. Introduction to Asian American History

162. Introduction to Chicano History and Culture—(Same as English 124C.)

165A. Colonial and Revolutionary America—Required for the American Studies major.

165B. 19th-Century America—Required for the American Studies major.

165C. The United States in the 20th Century

172A. America since 1945

173C. Introduction to Feminist Studies

229S. Undergraduate Research Seminar: The Second World War in Europe and America.

234A. Undergraduate Colloquium: Technology in 20th-Century America and Europe

252. Undergraduate Colloquium: Decision-Making in International Crises—The A-Bomb, the Korean War, and the Cuban Missile Crisis

253. Undergraduate Colloquium: Topics in African American History—The Great Migration

255A. Undergraduate Colloquium: Culture and Ideologies of Race

258. Undergraduate Colloquium: Modern America in Historical Perspective

259. Undergraduate Colloquium: Race and Ethnicity in the United States and South Africa

260S. Undergraduate Research Seminar: The Labor History of California

265. Undergraduate Colloquium: New Research in Asian American History

265A. Undergraduate Colloquium: The History of Sexuality in America

271. Undergraduate Colloquium: The History American Indians since 1934

272A. Undergraduate Colloquium: American Foreign and War Policy at Home and Abroad from Pearl Harbor to Vietnam, 1941-68

273A. Undergraduate Colloquium: Childhood in Modern American History

274A. Undergraduate Colloquium: Body Works—Medicine, Technology, Body in Late 20th-Century America

281A. Undergraduate Colloquium: Environmental History of the Americas

INDUSTRIAL ENGINEERING

170. Work, Technology, and Society
PSYCHOLOGY
174. African American Psychology

SCIENCE, TECHNOLOGY, AND SOCIETY
101. Science, Technology and Contemporary Society

SOCIOLOGY
118. Social Movements and Collective Action
138/238. American Indians in Comparative-Historical Perspective
139/239. American Indians in Contemporary Society
145. Race and Ethnic Relations
149. The Urban Underclass
150. The Family
151. Assimilation or Ethnic Persistence: Asians in America

LITERATURE AND THOUGHT
150. American Literature and Culture to 1855—(Same as English 121.) See “Core Lectures.”
151. The Transformation of American Thought and Culture, 1865 to the Present—See “Core Lectures.”
214. The American 1960s: Thought, Protest, and Culture

AFRICAN AND AFRO-AMERICAN STUDIES
105. Introduction to African and Afro-American Studies

COMPARATIVE LITERATURE
168. Introduction to Asian American Literature
202. Comparative Ethnic Autobiography

DRAMA
65. American Musical Theater
163. Performance and America

ENGLISH
112. Masterpieces of American Literature
119B. American and British Romanticism
158. French and American Symbolist Poetry
161A. Afro-American Writing, 1950-1970
161H. Narration, Detection, and Social Marginality
162G. Writing by 20th-Century Women of Color
163C. Chicana Writers
168A. Introduction to American Indian Studies
186A. Seminar: Psychological Themes in American Fiction—Poe to Hawkes
187D. Seminar: Modern British and American Poetry
187N. Seminar: Afro-American Autobiography
187S. Seminar: The Contemporary American Short Story
187T. Seminar: Hemingway and Fitzgerald
220D. Native American Writers and the 19th Century
239. American Short Fiction
291. Innovative American Fiction since 1945

HISTORY
162. Introduction to Chicano History and Culture—(Same as English 124C.)

LINGUISTICS
73. African American Vernacular English

MUSIC
5A. Music in America
18B. Jazz History: Bebop to the Present (1945-)

SPANISH
132. Mexican and Chicano Cultural Perspectives
242. Puerto Rican Literature: The Elusive Nation
280. Introduction to Chicano Literature
285. Chicana Expressive Culture

VISUAL AND MATERIAL CULTURE
152. American Spaces: Introduction to Material Culture and the Built Environment—(Same as History 152; Science, Technology, and Society 124) See “Core Lectures.”
given 1998-99

ART
121. Abstract Expressionism
130C. Around 1900: The Visual Arts in America
151. The Rediscovery of “Old New England”: 1865-1945
231N. Stanford Introductory Seminar: Hollywood and New York—The 1940s

COMMUNICATION
133. Communication and Culture
141B. History of Film: The Second 50 Years

ENGLISH
160G. Film Noir, with Literary and Cultural Backgrounds
HISTORY
50S. Introductory Seminar: Race and Popular Culture (in Black and White)

POLITICS, POLICY, AND ECONOMICS
179. Introduction to American Law—(Same as Law 106, Political Science 182F.) See “Core Lectures.”
215. Multi-Culturalism in American Law—See description under “History and Society.”
5 units, Win (Weiner)
216. Major Trials in African-American History—See description under “History and Society”
5 units, Spr (Weiner)

COMMUNICATION
1. Mass Communication and Society: Media Technologies, People, and Society
125. Perspectives on American Journalism
155/255. Interethnic Communication

ECONOMICS
116. American Economic History
157. Imperfect Competition
158. Antitrust and Regulation

EDUCATION
105. American Education and Public Policy—(Same as History 158B.)
220B. Introduction to the Politics of Education

ENGINEERING-ECONOMIC SYSTEMS AND OPERATIONS RESEARCH
194. The Role of Technology in Policy Decisions

POLITICAL SCIENCE
1. Major Issues of American Public Policy
10. American National Government
60. The American Dream
101P. Politics and Public Policy—(Same as Public Policy 101.)
104. Seminar: Urban Policy
162M. Research Seminar: The American Dream
164M. Seminar: American Democracy—A Critical Overview
171. Judicial Politics and Constitutional Law: Civil Liberties
186. Urban Politics
194R. Seminar: Law of Politics and Elections
196. Issues of Race in American Politics

SOCIOLOGY
118. Social Movements and Collective Action
149. The Urban Underclass

SCIENCE, TECHNOLOGY, AND SOCIETY
101. Science, Technology, and Contemporary Society

INDIVIDUAL WORK
195. Directed Research
1-5 units (Staff)
199. Directed Reading
1-5 units (Staff)

250. Senior Research Project—Research and writing of senior honors thesis under the supervision of a faculty member. The final grade for the thesis is assigned by the Chair based on the evaluations of the primary thesis adviser and a second reader appointed by the program. Prerequisite: consent of department chair.
1-15 units, any quarter (Bernstein)

ANTHROPOLOGY
Chair: William H. Durham
Associate Professors: Carol L. Delaney, James A. Fox (on leave), Joan H. Fujimura (on leave), Akhil Gupta (on leave), John W. Rick
Assistant Professors: Paulla Ebron (on leave Winter, Spring), Miyako Inoue, Purnima Mankekar (on leave)
Affiliated Faculty: Shirley Brice Heath (English), Susan Cashion (Dance Division), Raymond McDermott (Education), Hazel R. Markus (Psychology), Thomas P. Rohlen (Education)
Lecturers: Amy Burce, Amy Borovoy, Susan Charnley, Robert Franciscus, Hill Gates, Anne Maggioncalda, Julia Olson, Merritt Ruhlen
Consulting Assistant Professor: Dominique Irvine
Teaching Fellows: Beth Gerstein, Heather Paxson
Acting Instructors: Nicholas DeGenova, Ritty Lukose

The courses offered by this department are designed to (1) provide undergraduates with instruction in anthropology, a discipline treating humanity with regard to the processes shaping
culture, society, biological heritage, and person- 
hood; (2) provide undergraduate majors in anthrop- 
ology with a program of work leading to the bachelor’s degree; and (3) prepare candidates for 
advanced degrees in the discipline.

The department is currently developing two 
foci. One focus is on sociocultural anthropology, 
addressing a wide range of issues in anthropology 
including differences of race, class, national ori- 
gin, gender, sexual orientation, and religion as 
shaped by the experiences of education, history, 
and migration through which people in contem- 
porary societies define themselves in relation to 
others. This can be pursued through the curricu- 
um and degree requirements described below.

A second focus on biocultural anthropology 
emphasizes the biological and cultural aspects of 
human evolution and their interaction during the 
last few hundred thousand years. Course work and 
training is provided in paleo-anthropology, pre- 
historic archaeology, and evolutionary theory, 
with attention to the origins and biocultural ev- 
olution of modern Homo sapiens. The department 
is developing this program in collaboration with 
the Program in Human Biology. This focus can 
be pursued in undergraduate or master’s level 
study under current guidelines.

The Department of Anthropology (http://www- 
leland.stanford.edu/group/anthro) is responsible 
for collections of historic and prehistoric cultural 
material from all over the world, most notably 
from Native North America, the Pacific, Central 
and South America, and Africa. Some of these ob- 
jects are used in anthropology courses.

UNDERGRADUATE 
PROGRAMS 
BACHELOR OF ARTS

The Department of Anthropology offers two 
programs leading to the A.B. degree: the major 
in Anthropology and an interdisciplinary program, 
the major in Social Sciences (Anthropology). An 
honors program is offered in both majors. The major 
in Social Sciences (Anthropology) allows a 
candidate to combine a concentration in anthro- 
pology with a selection of courses from econom- 
ics, history, political science, psychology, and soci- 
ology. Students who want a program that in- 
cludes more than 10 units from a non-social 
science field (for example, classics) are advised 
to petition for an Individually Designed Major.

To declare the major, a student must fill out the 
Declaration of Major form in the Registrar’s 
Office, obtain the signature of their new Anthro- 
pology adviser, and contact the Department of 
Anthropology’s student program coordinator who 
will explain the degree requirements and give 
general guidance. It may be helpful for students 
to meet with the chair of the Undergraduate Com- 
mitee for initial academic advising and assistance 
in choosing an appropriate adviser in the depart- 
ment.

Majors in anthropology are required to meet 
with their advisers at least once every quarter. Each student’s progress towards fulfilling the major 
requirements is recorded in a file kept in the stu- 
dent program coordinator’s office. It is the stu- 
dent’s responsibility to see that this file is kept 
up to date.

The major in Social Sciences (Anthropology) 
requires a written application. The student must 
submit to the Undergraduate Committee a tenta- 
tive list of courses worked out with a faculty ad- 
viser and a brief statement that presents an intel- 
lectual rationale for the proposed program of study. 
Application forms may be obtained from the stu- 
dent program coordinator. Students must return 
the completed application to the student program 
coordinator no later than the beginning of the 
Winter Quarter of the junior year.

The Honors Program in Anthropology is open 
to all majors in the department. Candidates of 
sophomore or junior standing should submit an 
application to the student program coordinator no 
later than the end of the fourth week of the Spring 
Quarter. It must include a brief statement of the 
project, a transcript, a short paper, and a letter of 
recommendation from the professor who is to 
supervise the honors thesis. The Undergraduate 
Committee will review applications and notify 
accepted students.

All majors in the Department of Anthropology 
must fulfill the following requirements:

1. Competence in a foreign language beyond the 
   first-year level. Such competence is usually 
demonstrated by completing a course at the 
second-year level with a grade point average 
(GPA) of ‘C-’ or better, but the requirement may 
be met by special examination, presentation of 
superior foreign language placement scores, or 
certification in writing from an appropriate 
department.

2. A passing grade in Anthropology 90 (letter 
   grade only for students entering Stanford Au-
tumn 1996 or later). This course is required of 
all anthropology majors and should be taken 
before the end of the junior year. It introduces 
students to anthropological theory and prepares 
them for upper-division courses in the depart- 
ment.

The remaining requirements for the two degree 
programs are as follows:

Major in Anthropology—60 units, with at least 
40 in anthropology. The remaining 20 units may 
be taken from courses in related departments; such 
outside courses must be approved by the student’s 
adviser. Students whose programs require addi- 
tional language study as part of a geographical or 
linguistics focus may petition the Undergraduate 
Committee to count up to 10 units of language
courses toward the degree if such courses are at the second-year level or are in a second language. The units in anthropology must include at least one course in each of the five following topical categories: (1) area studies (102-126, 182B); (2) Social and Cultural Anthropology (1, 4, 7-18, 128-169); (3) Linguistic Anthropology (4, 5, 18, 71, 167, 170A-178); (4) Archaeology (3, 91/191, 182A, 184, 185, 186A, 187); (5) Biological or Biocultural Evolutionary Anthropology (5, 6, 180B, 180C, 181, 181A, 188A, 194, 196). For courses listed in two topical areas, the student may use the course to meet the requirement in either area, but not in both. In addition, students must choose an area of concentration, taking at least 15 units or three courses in that field. Possible areas of concentration include anthropological linguistics, archaeology, biological anthropology, and specialized areas within sociocultural anthropology such as health and nutrition, gender studies, economic development, symbolic systems, or a particular culture area. Students must have their areas of concentration approved by their advisers. Finally, anthropology majors are urged to take a field work course in archaeology, socio-cultural anthropology, or museum methods, and to enroll in at least one department seminar in addition to Anthropology 90.

Major in Social Sciences—35 units in anthropology and 25 units in related social science fields. The 60 units must form a coherent program of study and be approved by the student’s academic adviser and the Undergraduate Committee as part of the application for this major. Students whose program includes linguistic studies may petition the University Committee to have up to 10 units count toward the degree if such courses are at second-year level or are in a second language.

All required units for undergraduate programs must be passed with a GPA of ‘C’ or better, and not more than 5 units in anthropology and 3 units in related subjects) of the required 60 units may be taken for a Satisfactory/No Credit grade. Undergraduate majors who have completed the prerequisites are encouraged to enroll in 100- or 200-level seminars. They may also take part in field work on local archaeological sites, obtain training in museum methods by means of research with Stanford collections, and apply for funds to support summer field research in archaeology and social anthropology. In addition, they are encouraged to take part in department activities and to attend the department’s biweekly colloquia (Mondays) and other presentations. Specific dates and topics are posted in the department.

**MINORS**

Prospective Anthropology minors should request an Anthropology Minor Planning Form and Checklist from the department’s Academic Affairs Coordinator. Requirements for the minor are:

1. Have an Anthropology adviser approve the minor.
2. Complete 30 units of anthropology with a GPA of ‘C’ or better. Not more than 10 of the required 30 units may be taken for an instructor-elected Satisfactory/No Credit grade. No student-elected Satisfactory/No Credit units are allowable. Of the 30 units:
   a) Not more than 10 units may be in entry level courses, normally Anthropology 1-20, including no more than 5 units of the Anthropology Area 1 track.
   b) At least 15 units must be numbered Anthropology 70 or above.
   c) Five units must be in a geographical area course.
   d) Fifteen units must be in an area of concentration, approved by Anthropology minor adviser.
   e) Only 5 units of independent research can be used toward the minor.
3. Research experience is strongly encouraged. Anthropology courses include 71, Linguistic Field Methods; 91/191, Archaeological Field Methods; 93, Prefield Research Seminar; 94, Postfield Research Seminar; and 96, Directed Individual Study in cases in which the individual study involves independent research under faculty supervision.

**Deadline for Declaring**—Students must complete the declaration process (including the Anthropology adviser’s signature) no later than the last day of the quarter, two quarters prior to degree conferral (Autumn Quarter if Spring Graduation is planned).

**HONORS**

Candidates whose application to the honors program has been approved by the Undergraduate Committee must complete all of the requirements for their major and submit an honors thesis no later than four weeks prior to the end of the quarter in which graduation is anticipated. The thesis is read by the candidate’s adviser and a second reader appointed by the Undergraduate Committee. Honors candidates enroll in Anthropology 95A, Research in Anthropology, for as many as 10 units, and Anthropology 95B, Honors, for as many as 10 units. Most honors projects involve a total of 10-20 units of course work in 95A and 95B. No more than 5 of those units can count toward the 60-unit degree requirement.

**GRADUATE PROGRAMS**

University requirements for the degrees of Master of Arts and Doctor of Philosophy are described in the “Graduate Degrees” section of this bulletin.
MASTER OF ARTS

The Department of Anthropology offers the A.M. degree to four groups of students: (1) Stanford undergraduates who enroll in the coterminal program; (2) Stanford graduate students taking advanced degrees in other departments or schools at Stanford; (3) Ph.D. students in Anthropology who fulfill the A.M. requirements in the course of their work toward the Ph.D. degree; and (4) students who apply from outside of Stanford for entry into the terminal A.M. program.

Stanford students interested in the coterminal program and graduate students in other departments or schools at Stanford should review the "Graduate Degrees" section of this bulletin and consult with the student program coordinator in the department. Other prospective students should request application materials from Graduate Admissions, the Registrar's Office. Successful applicants for the A.M. program usually enter Autumn Quarter. Applications from Stanford students are reviewed in Winter Quarter if received by January 1 and in Spring Quarter if received by April 15. Outside applicants must file their scores on the Graduate Record Examination.

Applicants whose ultimate goal is the Ph.D. degree should apply directly to the Ph.D. program. Students accepted for the terminal A.M. degree program cannot transfer to the Ph.D. program; they must reapply on the same basis as other Ph.D. applicants and in competition with other Ph.D. applicants. Ph.D. students who decide to take the A.M. on the way to the Ph.D. are governed by separate requirements described in the department's Guide to the Ph.D. Program.

Graduate enrollment at Stanford for at least three quarters of full tuition is required of all candidates for the master's degree, including coterminal students. A.M. students in anthropology must take a minimum of 45 quarter units in anthropology beyond the undergraduate degree with a GPA of 'B' or better in each course. Thirty-six of those units, which constitute the University minimum for the A.M. degree, must be at or above the 100 level, and 18 of the 36 must be in courses designated primarily for graduate students (typically at least at the 200 level). The Department of Anthropology further requires at least 15 additional units of anthropology, taken at Stanford or elsewhere, constituting a minimum total of 60 units in anthropology. At the discretion of the department, the 15 additional units may have been taken in fulfillment of the undergraduate degree. Within the 45 units taken at Stanford, students must take one quarter (5 units) of History of Anthropological Theory (either 290 or 291, unless the A.M. concentration is in biocultural anthropology, in which case 290 is required), plus one additional graduate-level seminar in anthropology. The remaining units may be made up of courses selected in consultation with the faculty adviser to meet the needs and interests of the student.

The A.M. program usually requires more than one year of study. However, full-time students entering the program with appropriate background can complete the A.M. program in one calendar year. To provide a meaningful A.M. program within a one-year period, advance planning of course work with an adviser is required.

A field or library research paper read and approved by at least two departmental faculty members must be presented. Ph.D. students in the department may submit the first-year paper in fulfillment of this requirement. Other A.M. students must submit a project proposal for the master's paper for approval. Coterminal students must obtain approval either by the end of the second quarter of the fifth year of study, or if earlier, by the end of the quarter preceding the quarter in which the degree is completed. All other A.M. students must do so not later than the end of the second quarter of graduate study.

DOCTOR OF PHILOSOPHY

Prospective graduate students should request application materials from Graduate Admissions, the Registrar's Office. Applicants must file a report of their scores on the Graduate Record Examination and submit a writing sample in English that demonstrates the ability to produce original analytical work at the graduate level. Successful applicants for the Ph.D. program may enter only in Autumn Quarter. The deadline for applications is January 1.

The Ph.D. program includes a number of required courses and examinations. It also allows the student to develop a flexible program reflecting special interests, under the supervision of a faculty committee chosen by the student. Students are encouraged to plan for completion of all work for the Ph.D. in five years.

The Ph.D. requirements for students who matriculated beginning 1992 are as follows (those matriculating earlier should consult the department's Guide through the Ph.D. Program for their cohort).

1. Pass within the first year, at an acceptable graduate level:
   a) Three of the graduate-level courses in Anthropology designated by the faculty as evaluation courses, including History of Anthropological Theory (either 290 or 291; 290 in the case of doctoral concentration in biocultural anthropology).
   b) Archeological Data Analysis (184) or Anthropological Research Methods (289).
   c) At least 40 units of completed course work overall.
2. In the first year, enroll and participate in a year-long teaching apprenticeship practicum (Anthropology 298A,B,C).

3. Submit an acceptable, substantial research paper in the Spring Quarter of the first year.

4. During the second year, pass at a satisfactory level:
   a) At least three more of the graduate-level evaluation courses in the department; in the case of concentration in biocultural anthropology, 291A must be completed before the end of the second year.
   b) The Proposal Writing Seminar (Anthropology 294).
   c) At least 27 units of completed course work overall.

5. Serve as a teaching assistant during the second year for three courses (or two courses if not on University financial aid). An approved internship may be substituted for the third teaching assistantship requirement.

6. By the end of Winter Quarter in the second year, recruit the special examination committee, and by the end of Spring Quarter in the second year, schedule examinations (see item 9, below).

7. For those whose native language is English, pass by the end of Spring Quarter of the second year a reading examination in a language other than English in which there is a substantial body of general theoretical literature relevant to anthropology. For those whose native language is not English, demonstrate satisfactory command of English, as evidenced by successful completion of the first two years of graduate study.

8. Upon completion of the above requirements, and upon recommendation of the Anthropology faculty, petition for candidacy at the end of Spring Quarter of the second year or Autumn Quarter of the third year.

9. Pass a special examination (written and oral), before or during Winter Quarter (but in no case later than the fourth week of Spring Quarter) of the third year, covering the candidate’s major topic of specialization and one major ethnological or paleoanthropological area of the world. The oral part of this examination is normally taken as the University oral.

10. Serve as a teaching assistant for one course in the third year if on financial aid (waived for those who complete all requirements above no later than Winter Quarter of the third year).

11. Prepare a dissertation proposal to be approved by the student’s dissertation committee, and obtain needed research clearances before the end of Spring Quarter of the third year and before undertaking doctoral research.

12. Present an approved dissertation based on independent research.

Ph.D. MINOR

Prospective Ph.D. minors in Anthropology should request an application from the Department of Anthropology student program coordinator. The requirements for a minor in Anthropology consist of the following:

1. Complete 30 units of courses in the Department of Anthropology at Stanford with a grade point average (GPA) of ‘B’ or better. Course work for a minor cannot also be used to meet requirements for a master’s degree.

2. Enlist a faculty member within the Department of Anthropology at Stanford who will provide written consent to serve as the adviser for the minor (see the student program coordinator for a listing of faculty and office hours).

3. In conjunction with the adviser, determine a coherent course of study related to the Ph.D. program, including three courses in theory/methods and one course in a geographical area (for a list of current theory/methods courses, see the student program coordinator).

4. File the necessary paperwork with the student program coordinator. Department of Anthropology requirements listed above are more extensive than the University requirements.

FINANCIAL SUPPORT

The department endeavors to provide needed financial support (through fellowships, teaching and research assistantships, and tuition grants) to all students admitted to the Ph.D. program who maintain a satisfactory course of study. Applicants for the Ph.D. program must file a request for financial aid when applying to the program if they wish to be considered for support. First-year students in the Ph.D. program who have not entered with outside funding are required to apply for such funding during their first quarter. No financial support is available to students enrolled for the A.M. degree.

TEACHING CREDENTIALS

For information concerning the requirements for teaching credentials, consult the “School of Education” section of this bulletin or address the inquiry to the Credential Administrator, School of Education.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

UNDERGRADUATE

GENERAL

Open to all students, these courses are introductory in the sense that prior knowledge is not assumed. The numbers are only labels; they say nothing about the level of the course. Students who want a general introduction to human behavior and
culture are advised to take Anthropology 1; those who are interested in introductory courses focused on specific areas of anthropological inquiry should choose from among the courses numbered 2 through 18. A student who wants a comprehensive introduction to all four subfields of anthropology should take 1, 3, 5, 6.

1. Social and Cultural Anthropology—(Upper-division students register for 101.) Cross-cultural anthropological perspectives on human behavior, including cultural transmission, social organization, sex and gender, culture change, technology, war, ritual, and related topics. Lectures, films, and readings help present case studies illustrating basic principles of the cultural process. Students who have or are taking Anthro. 9 may not register for Winter Quarter. GER:4a (DR:2)

5 units, Win (Wolf)

3. Human Prehistory—The aims, methods, and data of prehistoric archaeology. Human society's development from early hunters through late prehistoric civilizations. Examines archaeological sites and remains characteristic of the stages of cultural development for selected geographical areas, emphasizing methods of data collection and analysis appropriate to each. GER:3b (DR:9)

3-5 units, Aut (Rick)

4. Language and Culture—Lecture on language in its cultural setting. Comparative approach, concentrating on monographic studies of (generally non-Western) speech communities. Languages, dialects, registers, jargons, writing, and nonverbal systems, and their rules of use. Linguistic relativism, encodability, and cultural origins of vocabulary and grammar. Structure of discourse, including conversation, narrative, and poetics. Language, gender, and power; style, strategy, and politics in manipulating the rules of use. GER:3b (DR:9)

4-5 units, Aut (Inoue)

5. The Biology and Evolution of Language—Language as an evolutionary adaptation of humans. Comparison of communicative behavior in humans and animals, and the inference of evolutionary stages. Structure, linguistic functions, and evolution of the vocal tract, ear, and brain, with associated disorders (stuttering, dyslexia, autism, schizophrenia) and therapies. Controversies over language "centers" in the brain and the innateness of language acquisition. Vision, color terminology, and biological explanation in linguistic theory.

4-5 units (Fox) not given 1997-98

6. Human Origins—(Same as Human Biology 6.) The human fossil record from the first non-human primates in the late Cretaceous or early Paleocene, 80-65 million years ago, to the anatomically modern people in the late Pleistocene, between 100,000 and 50,000 B.C. Emphasis is on the broad evolutionary trends and on the natural selective forces behind them. GER:2a (DR:5)

5 units, Win (Klein)

8,9,10. Origins, Encounters, Identities—The sequence fulfills the Area One Program requirement. How culture, language, and civilization have arisen, how peoples have understood and preserved insights from their past, how they have interacted in the context of imperial and colonial expansion, and how they have understood and construed nature, humankind, and their place within the cosmos as groups and individuals. Meets two hours per week in lectures and three hours per week in small group discussion. Ten units are applicable to the major in Anthropology. Enrollment limited, with priority to those applying the sequence to the Area 1 requirement.

8. Origins: Prehistory, Myth, and the Notion of the Primitive—Approaches to inferring human origins and interpreting people's explanations of their own and others' origins. Physical, linguistic, and comparative cultural evidence about the evolution and dispersion of humans in relation to the origins of Old and New World civilizations. Myths and the narratives of origin, including evolutionary theory, in relation to the way peoples think about themselves and others. The intellectual accomplishments of supposedly "primitive" and "advanced" cultures, asking whether their cognitive models of time, space, and the cosmos justify such differentiation. GER:1 (DR:1) (three-quarter sequence)

5 units, Aut (Delaney)

9. Encounters: The Anthropology of Contact and Conflict—The conquest of the Americas in the context of the expansion of Europe, beginning with the Iberian engagement with New Spain. How the Euro-American encounter resulting from the expansion of Europe shaped the identities of indigenous people while forging uniquely American identities of American-born Europeans (Creoles) and persons of mixed descent (Spanish, African, Amerindian). How the meanings of encounters shifted from the Renaissance during the Enlightenment and under 19th-century liberalism, and in the legacy and experience of California's populations. GER:1 (DR:1) (three-quarter sequence)

5 units, Win (G. Collier)

10. Identities: The Self, Belonging, and Destiny—European and U.S. ideas about the identities of individuals and the social groups to which they belong. Themes: the discovery and salvation of the self through love (romantic love and love of God), the making of the self through work, the meaning of "citizenship" and national identity, the role of property in shaping identity, the concept of the self as property, and the idea of the authentic self as a stable, internal essence. The different ways women and men...
from various racial, ethnic, and class groups experience and negotiate their identities. GER: 1 (DR:1) (three-quarter sequence)
5 units, Spr (Yanagisako)

11C. Gender in Cross-Cultural Perspective—Anthropological theories of gender constructions. Recent questions posed to anthropologists about representation, power, and the interpretive authority of ethnographers, drawing on a range of resources (ethnography, film, fiction, and life stories). How gender is a lens through which other forms of social organization can be illuminated and how given theoretical tools act as framing devices for the kind of cross-cultural interpretation one makes.
5 units (Ebron) not given 1997-98

5 units, Aut (Freedman)

SPECIAL

71. Linguistic Field Methods—Practical training in the collection and analysis of linguistic data from native speakers. Research goals, ethics, working in the community, technical equipment, and analytical strategies. Emphasis on the use of computers in collection and analysis, and the preparation of materials useful to the subject community. Prerequisite: introductory course in linguistics.
5 units (Fox) not given 1997-98

73A,B,C. First-Year Course in an Indigenous Language of Latin America—For beginners. Language varies, but typically is either Yucatec (Mayan), Quiché (Mayan), Nahuatl, or Quechua. (Dialect varies.)
4 units (Fox) not given 1997-98

74A,B,C. Second-Year Course in an Indigenous Language of Latin America: Quiché Mayan—Continuation from 73C. Prerequisite: 73C corequivalent.
4 units (Fox) not given 1997-98

90. Theory in Anthropology—Anthropological interpretations of other societies contain assumptions about ourselves and about "Western" societies. Seminar highlights that interplay and considers how underlying assumptions and implicit categories have influenced the presentation of data in a set of major anthropological monographs. Emphasis is on Karl Marx, Emile Durkheim, Max Weber, and anthropological analyses of nonwestern societies. (WIM)
5 units, Aut (Olson)

91/191. Archeological Field Methods—Student archeological field research in the local area. The practical working methodology of the archeologist through excavation and site survey, with training in registration, preservation, and analysis of archeological data.
5 units (Rick) not given 1997-98

93. Prefield Research Seminar—Prepares students for anthropological field research in other societies and the U.S. Instruction in data collection techniques includes participant observation, interviewing, surveys, sampling procedures, life histories, ethnohistory, and the use of documentary materials. Strategies of successful entry into the community, research ethics, interpersonal dynamics, and the reflexive aspects of fieldwork. Prerequisite: introductory course in anthropology or consent of instructor.
5 units, Spr (Olson)

94. Postfield Research Seminar—Helps undergraduates analyze and write about material gathered during summer fieldwork, emphasizing writing and revising as key steps in analysis and composition. Students critique classmates' work and revise their own writing in light of others' comments. Reading/discussion on ethical issues in fieldwork and ethnographic writing, setting research write-up concerns within broader contexts. Objective: produce an excellent ethnographic report based on original field research.
5 units, Aut (Rosaldo)

95A. Research in Anthropology—Independent research conducted under faculty supervision, normally taken junior or senior year in pursuit of an honors project. May be taken more than one quarter for credit. Prerequisite: completed application to the honors program.
1-10 units, any quarter (Staff)

95B. Honors—Taken in the final quarter of the student's work for graduation with honors. Independent study and honors thesis work for students admitted to the program. Prerequisites: acceptance to the honors program and a draft of the honors thesis.
1-10 units, any quarter (Staff)

96. Directed Individual Study—For undergraduate students with special needs, and showing capacity to do independent work. Prerequisite: 1 or consent of instructor.
any quarter (Staff)

98A. Maya Mythology Multimedia Project—Open to sophomores only. Seminar on the mythology, calendars, and astronomy of the ancient and modern Maya, emphasizing relationships between the Quiché mythological text, Popol Vuh, and Maya hieroglyphic texts, art, colonial documents, and modern ethnography. Discussion of theories of myth including classic works of Muller, Frazer, Freud,
and Malinowski. Lectures, discussion, and hands-on work in the development of an ongoing WWW project on the Popol Vuh.
5 units (Fox) not given 1997-98

99/199. Honors/Masters Writing Workshop—
(Graduate students register for 199.) For students in the process of writing honor’s or master’s papers. Techniques of interpreting data, organizing bibliographic materials, writing, editing, and revising. Also, preparation of papers for conferences and publications in anthropology.
2-6 units, Aut, Win, Spr (Paxson)

UNDERGRADUATE AND GRADUATE AREA STUDIES

102. Native American Cultures of North America—Introduction to diverse cultures of indigenous peoples in N. America before the European conquest. Lectures, readings, and films on the precontact situation, postcontact changes (including government policies), influences of Indian culture on American society and culture, and the contemporary situation of native peoples. An antidote to TV and movie Western stereotypes.
GER:4b (DR:3)
5 units, not given 1997-98

104. Language, Culture and Education in Native North America—Interdisciplinary examination of communication and language in cross-cultural educational situations, including language, literacy, and interethnic communication as they relate directly to native classrooms. Emphasis is on the implications of social, cultural, and linguistic diversity for educational practice in native class-intercultural differences between schools and native communities.
5 units, Spr (Nelson-Barber)

108. Dance and Culture in Latin America—
(Same as Drama 168.)
3-4 units, Spr (Cashion)

110. Introduction to Chicano Life and Culture—Chicano culture in historical perspective, including indigenous and African heritages and comparisons with Mexico and other U.S. Latino groups. Emphasis is on the contemporary period and popular culture. (GER:3b) (DR:9)
5 units, Spr (Rosaldo)

110B. Disrupting the Border: Mexican Migration and the Reconceptualizations of Latin American and Chicano Studies—Seminar examines Mexican migration to the U.S. as a standpoint of critique that enables a transnational perspective in studies of the U.S. nation-state, economy, and culture. A dialogue is created between Latin American and Chicano Studies. Enrollment limited to 25.
5 units, Win (DeGenova)

115. East Asian Miracle: Anthropological and Economic Perspective—Do “Asian values” explain rapid E. Asian economic growth? Contemporary anthropological views of culture and cultural production and economic research accumulation explain the phenomenon differently. Topics: education and socialization, nationalism, the role of women in the economy, demographic transitions, and household economics.
5 units, Spr (Borovoy)

117A. China’s Diaspora: The Emigrant Experience—The Chinese diaspora of Han people outside continental China beginning in the 14th century has spread millions of people to different settings. Its consequences must be understood as the outcomes of interaction between specific regions of origin and specific regions of settlement, each with a political-economic, cultural, and social context. The historical timing of migration into more fully capitalist environments is critical to the contributions emigrants have made in labor, small business, intellectual life, and in finance to the peoples among whom they now live. Emphasis is on defining the processes that reproduce common features of a varied diasporic population.
5 units (Gates) not given 1997-98

5 units (Gates) not given 1997-98

120. Modern India: History, Society, Cultures—
(Enroll in History 186A.)
5 units, Win (Mancall)

120A. Political Economy of India—The changing nature of relations of power in the Indian economy since British colonial rule. Conflicting interpreta-
tions of Indian economic history, the success of post-Independence development efforts, the relation between agriculture and industry in contemporary India, and the position of the subcontinent in the world systems. Prerequisite: 120/History 186.

5 units (Gupta) not given 1997-98

121. Japanese Society and Culture—Using anthropological literature as a baseline, discusses the problem of knowing and representing Japanese people, history, and culture. Beginning with a basic problematizing of any unreflective idea of "Japanese culture and society," students are introduced to diverse lives and historically-situated experiences to make them aware of the problems entailed in representation. Student interviews of Japanese people, ethnographic reports. GER:3b,4a (DR:2 or 9)

5 unit, Spr (Inoue)

126. The Middle East through Ethnography—For advanced undergraduates and graduate students. Exploration of the Middle East and anthropological theory through a close reading of a number of ethnographies. Emphasizes issues associated with the region (honor and shame, public and private, sexual segregation, religion, and orientalism).

5 units (Delaney) not given 1997-98

SOCIAL AND CULTURAL ANTHROPOLOGY

131. The South Asian Diaspora: Colonial and Postcolonial Relocations—Undergraduate seminar examines the diversity and specificities of S. Asian diasporas from colonial times to the postcolonial present. Focus is the cultural politics of gender, sexuality, race, and class in the diaspora, and the politics of "home" and its implications in the politics of gender, generations, sexualities, and families.

5 units, Aut (Lukose)

132. Gender in South Asian Communities at Home and Abroad—The relationship between men and women in S. Asian communities. Material from scholarship on gender relations in India, Pakistan, Bangladesh, Sri Lanka, Nepal, and overseas S. Asian communities (e.g., those in N. America, Africa, and the U.K.). Focus is on the relationship between the practices and ideologies of gender, and other social institutions (e.g., religion, family, the state, mass media, and ideologies of communalism and nationalism). Prerequisite: 120 or consent of the instructor.

5 units (Mankekar) not given 1997-98

133A,B,C. Ethics of Development in a Global Environment (EDGE)—(Same as Engineering 297A,B,C) Wednesday evening seminars on world affairs, mostly on issues affecting poor nations. Autumn Quarter treats war and peace: the background of current wars and peace negotiations, the UN peace keeping efforts, war and religion, arms trade. Winter Quarter treats international resources and commerce: the debt crisis, environmental protection, resource depletion, Japan in the world economy, aid and monetary institutions. Spring Quarter treats "poverty and prejudice": development models, comparative national health, AIDS, control of wealth, India-China-Africa America today. Speakers from Stanford and other institutions are experts who deal directly with world policy makers through research and advisory activities.

1-4 units, Aut, Win, Spr (Lusignan, Gupta)

134C. Restructuring Lives and Recapturing Meaning: The Post-1964 Asian American Experience—How Asian immigrants from India, Pakistan, and Sri Lanka, and S.E. Asian refugees from Cambodia, Vietnam, and Laos have coped with the changes at the individual, family, and community levels.

5 units, Spr (Welaratna)


1 unit (Mankekar, Yanagisako) not given 1997-98

138. Lesbian Communities and Identities—(Same as Feminist Studies 240/340.) Scholarship and research on the lesbian experience. Issues of homophobia, lesbian intimacy and sexuality, femme and butch roles, lesbian separatism, and the diversity of lesbian communities and identities. Prerequisite: consent of instructor.

5 units, Spr (Krieger)

139. Primate Societies—Introduction to primatology. Survey of the living primates, primate evolution, distribution, and taxonomy. Life history patterns, dominance hierarchies, reproductive strategies, and social structures. Focuses on cultural behaviors, including tool manufacture and use, language and communication, hunting and warfare, and political behavior. Analysis of current conservation issues.

5 units, Spr (Maggioncalda)

140. Aging: From Biology to Social Policy—What can we expect when we join the ranks of the elderly? What are the biological processes that contribute to aging and are they the same across all populations and cultures? What are the cultural, social, and economic consequences of a large proportion of the elderly? What implications do they have for social policy? Readings, lectures, and films.
Students are assisted in research and working with the elderly.

5 units (Barnett) not given 1997-98

142A. Women, Fertility, and Work: The Biology/Culture Debate about Gender—Is gender culturally or biologically determined? Or both? The arguments for sociobiological and cultural determinist explanations of the differences between women and men are compared, emphasizing where the two influences intersect most dramatically. Work as the locus for gender expression in gather/hunter, horticultural (Melanesian), southern Chinese, and Anglo American societies. GER:4c (DR:†)

5 units (Gates) not given 1997-98


5 units (Yanagisako) not given 1997-98

145A. Person, Gender, and Family in Welfare Policy—Explicit, implicit notions of the individual person, gender, and family embodied in U.S. welfare policy. Historical roots of welfare, its institutionalization, actual practices, and effects on recipients. Who has responsibility for children? Do theorists and policy makers have different assumptions about person, gender, and family when thinking about the poor? What assumptions are implied about marriage, the individual, interdependence? Underlying assumptions of personhood, gender, and family among those who shape policy.

5 units (Delaney) not given 1997-98

147A. Comparative Feminism—Preference given to juniors and seniors majoring in Feminist Studies and Anthropology. Interdisciplinary seminar for upper-level undergraduates. Women's struggles for empowerment, situating them in the specific cultural and historical contexts in which they have emerged in different parts of the world. Focus: broaden an understanding of women's struggles in the world, and develop analytical models that enable study of these struggles in their complexities and specificities by calling into question dominant assumptions about feminism.

5 units (Mankekar) not given 1997-98

151. Cultural Citizenship—Inequality and cultural differences in the U.S. and abroad (Mexico, the Caribbean, and S.E. Asia). Interdisciplinary and comparative methods emphasis.

5 units (Rosaldo) not given 1997-98

151A. Comparative Cultural Studies—Seminar introduces core concepts and theories of race and ethnicity employed by social scientists during the 20th century and to their underlying assumptions about society, culture, status, identity, and inequality. Critiques of these social science concepts and theories which have emerged from interdisciplinary fields e.g., feminist studies, ethnic studies, and cultural studies. Compares U.S. concepts and theories of race and ethnicity to those that have been developed in other areas of the world.

5 units (Ebron) not given 1997-98

151B. Theories of Race and Ethnicity: A Comparative Perspective—Introduces concepts and theories of race and ethnicity. Identifies and critically evaluates the underlying concepts and theories of race and ethnicity embedded in social science and cultural studies texts. U.S. definitions, ideas, and problems of race and ethnicity are compared to those in other countries in the last 45 years. GER:3b (DR:9)

5 units, Win (Yanagisako)

152. Symbolic Anthropology—For undergraduates. Symbolic anthropology is an approach to the study of human society developed along with the concept of culture as a system of symbols and meanings, a system presumed to be embedded in and expressed by institutions, values, attitudes, structures of everyday life, and social action. The intellectual roots, exemplary texts, and opportunities to do symbolic analysis.

5 units (Delaney) not given 1997-98

154. Creation/Procreation: A Comparative Study—(Same as Feminist Studies 147.) An alternative to the study of religion and reproduction as distinct categories and separate domains. The gendered aspects of cosmological or religious systems and the cosmological significance of gender in terms of their symbolic interrelationships. Anthropological and other literatures examine these relationships in several cultures, including our own. Emphasis is on the ways these beliefs are embedded in practices and structures of social life and on Western categories and meanings, and their implications for theorizing.

5 units (Delaney) not given 1997-98

157A. Racialization and Politics of Culture—Seminar on the constructions of cultural difference in the context of social inequality and subordination. Survey of the cannonical readings on the anthropological and sociological concepts of "culture" and "ethnicity" from landmark texts in contemporary cultural studies. Enrollment limited to 25.

5 units, Spr (DeGenova)

157B. The Cultural Politics of Social Reproduction: Youth/Gender/Class/Race—Advanced undergraduate seminar on the relevance of anthropological and cultural studies of educational institutions in the constitution of social inequalities and the centrality of educational institutions in the production of modern subjects. Theories of social reproduction and the material and discursive practices
that produce gender, race, and class-specific youth identities. Enrollment limited to 20.
5 units, Win (Lukose)

159A. The Multicultural City in Europe—European cities have become a kaleidoscope of peoples and cultures. What does multiculturalism mean in the European setting? How have different governments dealt with the issues, and with what results? Theoretical issues of migration, citizenship, and international labor as they affect people’s lives. How does culture affect how different groups utilize space and time, health, and educational resources? How do different notions of gender, family, work, religion, and food and clothing operate as symbols of identity? What are the politics of language? In what way does the city foster or mitigate difference?
5 units, Spr (Delaney)

160. Gender and Science—(Same as History and Philosophy of Science 160.) Seminar examines different perspectives on the study of gender and science, including biological, medical, and physical science. Topics: the historical and contemporary construction of gender and sex, feminist critiques of scientific theories and methods, the work (and lack of work) of women in science, and debates on gendered and feminist epistemologies. GER:4c (DR:±)
5 units (Fujimura) not given 1997-98

161. Human Ecology: Oceanic and East Asia—These regions of ancient human settlement exhibit different patterns of indigenous social organization and political economy, with highly distinctive ecological consequences. Both sustained agriculture for millennia. E. Asia (especially China and Japan) and Oceania (especially Highlands New Guinea and Insular Melansia) are examined to better understand the nature of that sustainability.
5 units, Aut (Gates)

162A. Social and Cultural Studies of Biotechnology—(Same as History and Philosophy of Science 162.) Current literature in sociocultural studies of biotechnology. Issues of concern at the intersection of biology and technology (e.g., human genome project, bioinformatics, biodiversity, virtual reality, artificial life, cyborgs and representations, and products in biology, biotechnology, and medicine). Sociocultural questioning about the organization of scientific work, the universalization and formalization of knowledge, the transformation of societies via novel products, multicultural ways of knowing, definitions of life, and ethical and legal concerns. GER:3b (DR:9)
5 units (Fujimura) not given 1997-98

163A. Ethnic and National Identities—The contribution of romantic anthropology (Vico, Heder, Jung) to European continental ethnology/folklore studies and to nationalist ideologies. Uses of ethnographic authority and knowledge in ethnic politics in Europe and in the areas of the former Soviet bloc.
5 units, Win (Sxorin-Chaikov)

164. Ecological Anthropology—(Same as Human Biology 134.) The relationship between human populations and their environments. Theories on how environment influences human behavior and culture, and how human populations shape the environment. Classical approaches within the field: cultural ecology, systems theory, optimization theory, evolutionary ecology, and population dynamics. Current research on indigenous systems of resource management, common property resources, and political ecology.
3-5 units (Durham) not given 1997-98

168. Medical Anthropology—For students with interests in health care. Introduction to curing systems in our own and in non-Western cultures; problems of adapting modern medicine to diverse cultures; explication of the social and cultural correlates of physical and mental health and disease (social epidemiology). GER:3b (DR:9)
5 units, Aut (Barnett)

169/269. Community-Based Conservation—Community-based conservation has emerged as an alternative to top-down regulatory and preservationist approaches to environmental protection. Case studies from the U.S., Africa, and Latin America examine the different strategies communities are employing to promote local environmental conservation. Topics: watershed approaches, ecoregional partnerships, cooperative resource management agreements, sustainability indicators, ecological footprinting, and environmental justice.
3-5 units, Spr (Charnley)

LINGUISTIC ANTHROPOLOGY

172. Indigenous Languages of North and South America—Survey of Native American languages, their history, classification, structure, and possible Old World relationships. The relationship between Native American languages and the development of anthropological and linguistic theory. Native American writing systems. Problems of language, culture, and world view.
5 units (Fox) not given 1997-98

173. Maya Hieroglyphic Writing—Lectures/workshops on the decipherment of the hieroglyphic writing of the ancient Maya. Writing on stone, wood, bone, shell, ceramics, and screenfold books. Calendrical, astronomical, historical, and mythological texts. Maya scribal practice and literacy. Related Mesoamerican writing systems and the origins of Maya writing.
5 units (Fox) not given 1997-98

178. Introduction to Language Change—Variation and change as the natural state of language. Differentiation of dialects and languages over time. Determination and classification of historical relationships among languages, and reconstruction of
an ancestral stages. Types and explanations of change. Parallels with genetic and cultural evolutionary theory, and implications for the description and explanation of language in general. Language as a window on prehistory: contact, migrations, and the vocabulary of ancient institutions.

5 units (Fox) not given 1997-98

ARCHEOLOGY AND BIOLOGICAL ANTHROPOLOGY

180A/280A. Human Evolutionary Systematics—Recent developments and debates in the application of evolutionary systematics specifically to the human fossil record: the utility of cladistic vs. phenetic methods, especially at the species and subspecies level; trait definition and conceptualization; and the utility of heterochroni and functional information in phylogenetic reconstruction.

5 units


GER:2a (DR:5)

5 units, Aut (Franciscus)

180C/280C. Advanced Human Osteology—Analysis of human bone remains from archaeological and paleontological sites. In-depth analysis of fragmentary skeletal remains from an archaeological site prior to their reburial. Analysis includes morphometric measurements and observations of various skeletal elements, and assessment of age, sex, and pathological conditions of individual specimens. Cultural influences on skeletal variability, and the assessment of prehistoric population dynamics.

GER:2a (DR:5)

5 units, Win (Franciscus)

181/281. Evolutionary Anthropology—(Same as Human Biology 181.) Upper-division/graduate seminar focusing on the concept of evolution as used in anthropology. Theory in biological anthropology as applied to hominid evolution and human population genetics. Evolutionary approaches to culture and social organization, including social evolution, sociobiology, and evolutionary culture theory. Enrollment limited to 20.

5 units (Durham) not given 1997-98

181A. Human Evolutionary Genetics—For upper-division graduate students. The evolution of modern humans as inferred from available genetic data. Quantitative methods used to analyze mitochondrial DNA allele frequencies. Inference of human migrations and expansion. Genetic support for models of the evolution of modern humans. Comparison of genetic data with archaeological and linguistic data. Emphasis is on critical reading of the literature. Prerequisite: Human Biology core or equivalent. Recommended: introductory course in statistics.

4-5 units, not given 1997-98

181C/281C. Human Evolutionary Anatomy—For upper division and graduate students. Focuses on the basis for reconstructing the form, adaptation, and life style of prehistoric humans—the interpretation of their skeletal remains. Integrating features: musculature, body size, stance, brain size and organization, activity patterns, sexual dimorphism, and speech potentiality. GER:2a (DR:5)

5 units (Franciscus) not given 1997-98

182. Climate and Human Evolution—For upper division and graduate students. Patterns of human morphological diversity and adaptive response to climate has played a pivotal role in human evolution. The role of technology and cultural buffering in climatic adaptation, especially in the later phases of human evolution and its impact on our understanding of modern human emergence.

5 units (Franciscus) not given 1997-98

182A. Archaeology and Education at Zuni Pueblo—Intensive experience in archaeological education in Zuni, N.M. Participants learn Southwest archaeology and simultaneously work as teachers and tutors for Zuni High School students in a Stanford-sponsored archaeology course. Stanford students lead archaeological research projects and plan field trips and other class activities while living in the pueblo. Insights to prehistory, history, and current conditions of life on Indian reservations. Contact Department of Anthropology early in academic year. Enrollment limited to 6.

6-9 units (Rick) not given 1997-98

182B. Cultural Anthropology of the Southwest—Intensive field experience at Zuni pueblo in northern New Mexico. Stanford students work as teachers and tutors for Zuni High School students who also take the course. Guidance is provided to develop and carry out research and service activities in the pueblo and plan field trips and service activities. Contact Department of Anthropology. Enrollment limited to 6. Corequisite: 96.

6-9 units, not given 1997-98

183/283. Language and Prehistory—What light can modern human languages shed on human prehistory? How does this linguistic evidence fit into the larger perspective on human prehistory that includes archaeological and genetic evidence? Recent developments in comparative linguistics and their correlation with human genetics and the archaeological record. The origin of existing languages and the people who speak them. Where did today’s languages come from and how can this diversity be used to study human prehistory? Evidence from related fields (archaeology and human genetics).
evolution. Implications of recent research in the
reveal about the pattern and process in organic
Galapagos for understanding evolutionary dynam-
atic processes

184/284. Archaeological Data Analysis—The
univariate, multivariate, and graphical methods used
for analyzing archaeological and paleobiological
data. Archaeological and palaeontological examples
illustrate various methods. Recommended: knowledge
of algebra.
5 units (Klein) not given 1997-98

185/285. Stone Tools in Prehistory—Archaeol-
gists rely on an understanding of stone tools to trace
much of what we know of prehistoric societies. How
to make, illustrate, and analyze stone tools,
revealing the method and theory intrinsic to these
artifacts. Recommended: previous archaeology
course work. GER:2b (DR:6)
5 units, Spr (Rick)

187/287. Hunter-Gatherers in Archaeological
Perspective—Organization and subsistence of band-
level hunter-gatherers as approached through ar-
chaeological investigations. Modern hunter-gath-
ers provide background for prehistoric groups.
The archaeological record of Africa, Europe, and
the New World provides examples of how archaeo-
logical data reconstructs the cultural systems of
extinct hunter-gatherers.
5 units (Rick) not given 1997-98

188/288. Biomechanical Approaches to Human—
Overview of engineering theory, principles, and
applied methods used to study the evolution of
functional complexes in human fossil skeletal re-
mains: the jaws and teeth and dietary/non-dietary
dental use, lower limb gait analysis and the evolu-
tion of bipedalism, and long bone loading and
remodeling in response to daily behavior and stresses.
5 units, Win (Franciscus)

189. Incas and their Ancestors: Peruvian Ar-
chaeology—The development of high civilizations
in Andean S. America from hunter-gatherer origins
to the powerful, expansive Inca empire. Contrasting
ecologies of coast, sierra, and jungle areas of early
Peruvian societies 12,000-2,000 B.C. Domestication
of indigenous plants, which provided the eco-

omics. Lectures/discussion/optimal field trip to
Galapagos Islands (at extra expense, limited capac-
itv). Limited to 25 sophomores and juniors. Prereg-
istration essential: forms available in Human Biol-
ogy office. Prerequisites: Human Biology core or
consent of instructor.

5 units (Durham) not given 1997-98

194. The Origins of Modern Humans—Analysis
of the data and theories bearing on the origins of
anatomically modern humans between 100,000 and
50,000 years ago. Emphasis on the two major com-
peting theories: that modern humans originated
more or less simultaneously from non-modern hu-
 mans in many regions of Africa and Eurasia; or that
modern humans originated exclusively in Africa
and spread from there, largely replacing non-mod-
ern humans elsewhere. GER:2a (DR:5)
5 units, Spr (Klein)

196. Evolution and the Brain—Advanced under-
graduate seminar on the expansion and reorganiza-
tion of the brain in the course of human evolution,
particularly the last few million years. Major theo-
ries and evidence for encephalization, laterality,
and the evolution of consciousness. Topics: allom-
etry, modularity, lateral specialization, language
ability, and the interaction of mind and brain.
5 units (Durham) not given 1997-98

GRADUATE AND ADVANCED
UNDERGRADUATE

223. Seminar on Japanese Anthropology—
Anthropological issues and problems on Japan.
Focuses on Nihonjinron (Japanese cultural iden-
tity).
5 units, Aut (Inoue)

224. Eastern European Social Thought—Works
of 20th-century theorists from Russia and Eastern
Europe (Bakhtin, Propp, Vigosky, Chayanov,
Kornai, Heller, Lukacs, Zizek, etc.). Analytical con-
cepts these scholars deploy (e.g., culture, individual,
power, ideology etc.), the cultural and political
context in which they do so, and examples of anthro-
pological uses of these concepts.
5 units, Spr (Sorin-Chaikov)

226. Globalizational and Transnational Pro-
cesses: Rethinking Anthropology for the 21st Cen-
tury—Current research on transnational sociocul-
tural processes within the framework of a critical
political economy of globalization and its
reconfigurations of sociopolitical space. The sig-
nificance of labor migrations, diasporic politics,
transnational community formation, and rec-
racialization as challenges commanding a renova-
tion of anthropological theory and methodology.
Enrollment is limited to 20.
5 units, Spr (DeGenova)

227. Linguistic Anthropology—For advanced
undergraduates or graduate students. The primary
of language's multifunctionality and its constitutive roles in constructing, rather than reflecting, social forms such as gender, ethnicity, class, authority, profession, etc., through our daily linguistic practice. Emphasis is on cross-cultural perspectives, exploring the complex and culturally-specific roles of language in our cognitive, social, and political practices.

5 units (Ihnow) not given 1997-98

232. Social and Cultural Studies of Science—
(Same as History and Philosophy of Science 232.) Seminar on science as social activity; recent approaches to the social production of scientific knowledge and technologies as constructed through cultural practices and the organization of scientific work. Related issues in the studies of knowledge, culture, politics, work, and organizations.

5 units, Spr (Fujimura)

237. Applied Anthropology—Anthropologists apply their knowledge and skills to a variety of problems: developing and evaluating medical care delivery systems and educational programs at home and abroad; assisting in the transfer of technological innovations and predicting and measuring their impact; serving as planners, administrators, and advisers for development programs. The substance of such programs, the utility of anthropological theory and research approaches in solving contemporary problems, and the ethics of professional practice.

5 units (Barnett) not given 1997-98

242. Reading Theory through Ethnography—
Graduate seminar focusing on contemporary ethnography and related sociocultural theories generated by texts. Topics: agency, resistance, identity formation, discourse analysis, etc.

5 units (Ebron) not given 1997-98

243. Culture as Commodity—
Graduate seminar focusing on theories of commodification, interests in tourism, national cultures as marketable objects, how identities are constituted through production and consumption. Formation of global style and taste.

5 units, Aut (Ebron)

244A. Naturalizing Power: Kinship/Gender/Race/Sexuality—
Graduate seminar examines discursive and material practices through which social relations of inequality are naturalized. Ideologies of family, kinship, gender, race, and sexuality are compared to consider parallel processes of naturalization and mutual affirmation. The role of anthropological theory in these naturalizations. Enrollment limited to 20. Prerequisite: graduate student or advanced undergraduate major in anthropology, or consent of instructor.

5 units (Yanagisako) not given 1997-98

245. Advanced Feminist Theory—
Interdisciplinary graduate seminar examines cultural differences and recent feminist theory within dialogues of contemporary social theory. Enrollment limited to 20. Prerequisite: graduate student or advanced undergraduate major in anthropology, or consent of instructor.

5 units (Ebron) not given 1997-98

246. Feminist Theories of Science and Technology—
(Same as History and Philosophy of Science 233.) Feminist theories and studies of science, technology, and medicine, especially as they intersect with cultural studies of science and technology. Focuses on feminist epistemologies, and questions whether, and how, they challenge and shift the lens of current practices in science and technology. How gender is constructed by and constructs the technosciences.

5 units (Fujimura) not given 1997-98

247. Feminist Methodologies—
Interdisciplinary graduate seminar for students with thorough working knowledge of feminist theories. Focus is on feminist epistemologies and methodologies, drawing on questions from feminists working at the intersection of feminist anthropology and cultural studies, and in political theory, film theory, history, and literary theory. Feminist negotiations of poststructuralism and postmodernism and interrogations of concepts such as difference, experience, fieldwork, location, and voice. Students think through readings by doing specific research, pedagogical, and community projects.

5 units (Mankekar) not given 1997-98

248. Gender and Social Theory—
Seminar analyzes the ways in which gender figures in the work of a variety of "classical" and contemporary social theorists.

5 units (Delaney) not given 1997-98

249. Seminar on Studying Up—
Graduate seminar on issues in cultural theory and methodology through research on people who have greater material and cultural resources than those usually studied by anthropologists. How ideas about ideology, hegemony, identity, power, and practice are altered when we study those we consider to be agents of power rather than the subaltern. Topics: transnational capitalist families, colonial administrators, male gender identity, white racial subjectivity, and scientists. Enrollment limited to 20.

5 units (Yanagisako) not given 1997-98

250. Nationalism and Gender—
The co-implication of discourses of nationalism and gender, focusing on nationalist movements and ideologies in newly-independent countries and "Third World" contexts. Themes: discourses and practices of colonialism and postcoloniality; the policing of sexuality; the intersection of nationalism with institutions such as the state, mass media, and the family; masculinity, femininity, and militarization; and
questions of representation, historiography, location, and strategy.

5 units (Mankekar) not given 1997-98

251. Issues in Cultural Studies—Focuses on the politics of identity and community. Broader topics: questions of nationalism, displaced nationalism, and ethnicity. Interdisciplinary readings in cultural studies provide a theoretical context.

5 units (Rosaldo)

251B. Cultural Citizenship—Inequality and cultural differences in the U.S. and abroad (Mexico, the Caribbean, and S.E. Asia). Interdisciplinary and comparative methods emphasis.

5 units, Aut (Rosaldo)

252. Advanced Symbolic Anthropology—Symbolic anthropology is an approach to the study of human society developed along with the concept of culture as a system of symbols and meanings, a system presumed to be embedded in and expressed by institutions, values, attitudes, structures of everyday life, and social action. The intellectual roots of this approach and some contemporary works motivated by it.

5 units (Delaney) not given 1997-98

253. Religion—Covers theoretical and ethnographic material, sensitizing students to the complexity of the issues involved in the study of religion. In what ways is it useful, or not useful, to talk of religion as a human universal? What is the nature of religion, how is it practiced and by whom, what counts as religious phenomena and what accounts for the persistence of religion and the power of religious movements? What is the relationship between religion and state and what are some issues blurring that distinction? What is the relation between religion, power, and gender? Prerequisite: consent of instructor.

5 units, Win (Delaney)

257. Law and Culture—Seminar focusing on recent writings on the role of law and legal processes in defining and policing differences among people. Readings on law’s role in differentiating citizens from non-citizens, and in fostering identities based on apparently natural characteristics, e.g., age, sex, sexuality, race, and ethnicity.

5 units, Win (J. Collier)

259A. Political Economic and Poststructuralist Theories of the State—Advanced graduate seminar on classic and contemporary Marxist, structuralist, and poststructuralist approaches to the state. Readings initiate a dialogue between institutional analysis and those emphasizing processes of representation and the cultural construction of the state. Prerequisite: 262 or consent of the instructor.

5 units (Gupta) not given 1997-98

262. Topics in Political Economy—Introduction to selected themes in political economy, emphasizing Marxist approaches. Topics: the development and articulation of capitalism, imperialism, colonialism, dependency, and world systems; 20th-century capitalism, post-Fordism, and postmodernism; the political economy of race, gender, and ethnicity; class relations and productive inequalities in the Third World; the discourse of development; and the cultural mediation of political economic transformation. Ethnographic material that employs these theories to examine specific socio-historical contexts.

5 units (Gupta) not given 1997-98

262A. Political Economy and Social Relations: Anthropological Problems of Representations and Critique—Graduate seminar on the classical critique of the categories of political economy and contemporary literature on unequal relations of wealth and power in the modern world system, posing critical questions about the tasks and stakes of anthropological inquiry. Situates sociocultural anthropology (methodological protocols and representational techniques) in terms of historical conditions of possibility within the political economy of the modern global order.

5 units, Aut (DeGenova)

263. Political Ecology—Graduate seminar focused on the causes and consequences of environmental degradation in diverse social and ecological settings. Emphasis is on the role of current trends in ecological anthropology, social and cultural forces in ecological change, including forces that promote differential access to resources within and between local populations. Case studies: tropical deforestation, rangeland degradation, soil erosion, drought, and famine.

5 units (Durham) not given 1997-98

264. Advanced Ecological Anthropology—Semi- nar on role of ecological models in the analysis of culture and social systems. Major monographs review early efforts linking environments and social systems (multilinear evolution, neo-functionalism, adaptive radiation), and evaluate current theory and research trends. Case studies include agricultural inversion in Java, ritual regulation in New Guinea, demographic change in the Swiss Alps, peasant ecology of Central America, and politics of conservation and development in Amazonia. Prerequisite: 164 or graduate standing.

5 units (Durham) not given 1997-98

265. Advanced Psychological Anthropology—Analysis of selected psychocultural processes and theory. Attention to group and individual adaptations to rapid cultural change and urbanization. Prerequisite: consent of instructor.

5 units (Staff) not given 1997-98

266. Cultural Transmission: Education in Cross-Cultural Perspectives—The transmission and communication of explicit and implicit cultural assumptions in a variety of formal and informal educational
contexts. The patterning of education in a cross-cultural perspective, the sequence of culturally constructed experiences in life careers, cultural analysis, and sensitization. Attention to education in the U.S. and other complex societies, and in non-literate cultures.

3-5 units (G. Spindler) not given 1997-98

270. Topics in Biocultural Anthropology—Graduate seminar on topics and issues in the evolution of human diversity. Emphasis to the current and future research efforts of biocultural faculty in the department, and how they relate to evolutionary patterns and processes. Parallels and contrasts between genetic, cultural, linguistic change, and theory and methods for illuminating the evolutionary diversification of our species.

1-3 units, Aut (Rick, Durham, Klein)

273. Seminar in Advanced Medical Anthropology—Students work on a previously chosen research problem of their choice in medical anthropology and as it progresses, present their work for supportive discussion and assistance. Prerequisite: 168 or consent of instructor.

5 units, Win (Barnett)

277. Linguistic Anthropology—Seminar on language in its cultural context. Topics similar to those of Anthropology 4, but reading emphasis is on journal articles.

5 units (Fox) not given 1997-98

278. Topics in Linguistic Anthropology: Language and Prehistory—Seminar on a key issue on language in its cultural context.

5 units (Fox) not given 1997-98

279. Readings in Linguistic Anthropology—Readings and discussion of one or two major (and related) works on language in its cultural context. Recommended: 178.

1-2 units (Fox) not given 1997-98

280. Ethnographic Approaches to Cultural Diversity in Schooling—(Same as Education 280.) How to learn about culture and to analyze education-related situations such as the culturally diverse classroom. The cultural process is approached by acquiring techniques of observation, interview, and interpretation of behavior in context, and soliciting and recording the “native” explanations of their own behavior; developing an internally consistent conceptual structure that orients observation and elicitation productively; and being sensitized to one’s own culture and how it influences perception and interpretation of behavior. Techniques of ethnographic research applicable to the study of schooling are demonstrated and applied in modest field research projects. Writing of one research report or proposal for research.

4 units, Win (G. Spindler)

289. Anthropological Research Methods—Open to all graduate students; Anthropology Ph.D. candidates have first priority. Introduces a range of research methods and modes of evidence building in ethnographic research. Enrollment limited to 10.

5 units, Spr (Yanagisako)

290. History of Evolutionary Theory in Anthropology—The history of evolutionary theory from the 19th century, emphasizing anthropological applications. Readings: Darwin to Dawkins, and the usage of evolutionary theory in anthropology today. Critical evaluation of dual inheritance and cultural transmission theory, sociobiology, and relevant portions of evolutionary psychology. Prerequisite: graduate standing in anthropology or consent of the instructor.

5 units, Win (Durham)

291. History of Anthropology Theory: 20th Century—Comparative analysis of the development of social and cultural anthropology in France, Britain, and the U.S., focusing on the interplay between the development of anthropological theory, and the changing political and economic circumstances in which it developed.

5 units, Aut (J. Collier)

292. Dissertation Seminar—For graduate students in the process of writing dissertations and preparing for professional employment.

Aut, Win, Spr (Delaney)

293. Internship

any quarter (Staff)

294. Proposal Writing Seminar—Required of Ph.D. students in Anthropology in their second year. Treats conceptualization of dissertation research problems, the theory behind them, and the methods for exploring them. Participants draft a research prospectus of the sort suitable for dissertation proposals and research grant applications. Limited enrollment. Prerequisite: 289 or consent of instructor.

5 units, Spr (G Collier)

295. First-Year Paper

2-3 units, Win, Spr (Inoue)

296. Research Assistantship—Supervised work with an individual faculty member on the student research project. May be taken for more than one quarter.

5 units (Staff)

297. Directed Individual Study—Opportunities for advanced students to explore special areas of interest.

any quarter (Staff)

298. Teaching Assistantship—Supervised experience as assistant in one undergraduate course.

5 units, any quarter (Staff)

298A, B, C. Teaching Apprenticeship Practicum—Required of Ph.D. students in Anthropology in their first year of study. Orientation and
training in the skills and practices of effective undergraduate teaching. Limited enrollment, consent of instructor.

2 units, Aut, Win, Spr (Gerstein)

299. A.M. Project—Research in connection with the master’s paper.
any quarter (Staff)

AFFILIATED DEPARTMENTAL OFFERINGS
AFRICAN AND AFRO-AMERICAN STUDIES
105. Introduction to African and Afro-American Studies
5 units (Staff)

EDUCATION
287. Culture and Learning
3 units, Sum (Baugh, McDermott)

LINGUISTICS
146. Language and Gender
4 units, Spr (Eckert)

PSYCHOLOGY
160. Culture and Self
4 units, Win (Markus)
161. Cultural Psychology
4 units, Spr (Markus)

SLAVIC LANGUAGES
194. Demonology in Russian and other Slavic Cultures
4 units, not given 1997-98

SOCIOL ogy
333. Social Control and Resistance to it: The Role of Law in Colonialism Projects
5 units, given 1998-99

OVERSEAS STUDIES
These courses are approved for the Anthropology major and taught overseas at the campus indicated. Students should discuss with their major advisers which courses would best meet individual needs. Descriptions are in the “Overseas Studies” section of this bulletin or at the Overseas Studies office, 126 Sweet Hall.

PUEBLA
108X. Race and Ethnicity in Mexico
5 units, Win (Shadow)

110X. Social and Political Reflections in the Art of Prehispanic Mexico
5 units, Win (Plunket)

APPLIED PHYSICS

Emeriti: (Professors) Marvin Chodorow, C. Chapin Cutler, Theodore H. Geballe, W. Conyers Herring; (Professors Research) Bertram A. Auld, H. John Shaw; (Courtesy) Gordon S. Kino, William E. Spicer

Chair: Aharon Kapitulnik


Associate Professor: Zhi-Xun Shen

Assistant Professors: Martin Greven, Kathryn A. Moler

Professors (Research): Helmut Wiedemann, Herman Winick

Associate Professor (Research): Martin M. Fejer

Courtesy Professors: James S. Harris, Lambertus Hesselink, David A. B. Miller, Douglas D. Osheroff, Anthony E. Siegman

Courtesy Associate Professors: Bruce M. Clemens, Shoucheng Zhang

Courtesy Professor (Research): Calvin F. Quate

Consulting Professors: Richard G. Brewer, Bernardo A. Huberman, Stuart S. P. Parkin, Daniel Rugar

Consulting Associate Professor: John D. Fox

The Department of Applied Physics offers qualified students with backgrounds in physics or engineering the opportunity to do graduate course work and research in the physics relevant to technical applications and natural phenomena. These areas include astrophysics, condensed matter physics, physics of biological macromolecules, quantum electronics, space science, and superconductivity. Student research is supervised by the faculty members listed above and also by various members of other departments such as Electrical Engineering, Materials Science and Engineering, and Physics, who are engaged in related research fields. Research activities are carried out in the Center for Materials Research, the Center for Space Science and Astrophysics, the Department of Applied Physics, and in the Ginzton Laboratory, Hansen Experimental Physics Laboratory, Solid State Electronics Laboratory, and Stanford Synchrotron Radiation Laboratory.

The number of graduate students admitted to Applied Physics is limited. Applications should be received by January 1, 1998. Graduate students normally enter the department only in Autumn Quarter.
GRADUATE PROGRAMS

Admission requirements for graduate work in Applied Physics include a bachelor’s degree in physics or an equivalent engineering degree. Students entering the program from an engineering curriculum should expect to spend at least an additional quarter of study acquiring the background to meet the requirements for advanced degrees in Applied Physics.

MASTER OF SCIENCE

The University’s basic requirements for the master’s degree are discussed in the “Graduate Degrees” section of this bulletin. The minimum requirements for the degree are 36 units, of which at least 30 units must be graduate-level courses in applied physics, engineering, mathematics, and physics. The required program consists of the following:

1. Courses in physics and mathematics to overcome deficiencies, if any, in undergraduate preparation.
2. Basic graduate courses:
   a) Advanced Mechanics—one quarter, 3 units: Physics 210
   b) Electro dynamics—two quarters, 6 units: Physics 220, 221; Electrical Engineering 241, 242
   c) Quantum Mechanics—two quarters, 6 units: Physics 230, 231
3. Additional advanced courses in science and/or engineering, not including Directed Study (Applied Physics 290), Dissertation Research (Applied Physics 390), and 1-unit seminar courses.
4. A final overall grade point average (GPA) of ‘B’ is required for courses used to fulfill degree requirements.

There are no department or University examinations, and a thesis is not required. If a student is admitted to the M.S. program only but later wishes to change to the Ph.D. program, the student must apply to the department’s Admissions Committee.

DOCTOR OF PHILOSOPHY

The University’s basic requirements for the Ph.D. (residency, dissertation, examination, and so on) are discussed in the “Graduate Degrees” section of this bulletin. The program leading to a Ph.D. in Applied Physics consists of course work, research, a Ph.D. candidacy qualifying examination, a research progress report, a University oral examination, and a dissertation as follows:

1. Course Work*
   a) Courses in physics and mathematics to overcome deficiencies, if any, in undergraduate preparation.
   b) Basic graduate courses:
      1) Advanced Mechanics—one quarter: Physics 210
      2) Statistical Physics—one quarter: Physics 212
      3) Electrodynamics—two quarters: Physics 220, 221; Electrical Engineering 241, 242
      4) Quantum Mechanics—two quarters: Physics 230, 231
      5) Laboratory—one quarter: Applied Physics 207, 208, 304, 305; Electrical Engineering 357, 410; Physics 201, 202, 203, 301; Materials Science and Engineering 171, 172, 173
   c) 18 units of additional advanced courses in science and/or engineering, not including Directed Study (Applied Physics 290), Dissertation Research (Applied Physics 390), and 1-unit seminar courses.
   d) A final average overall GPA of ‘B’ is required for courses used to fulfill degree requirements.
   e) Students are normally expected to complete the specified course requirements by the end of their third year of graduate study.

2. Research: may be conducted under the supervision of a member of the Applied Physics faculty or appropriate faculty from other departments.

3. Ph.D. Candidacy Qualifying Examination: must be passed before the third year of graduate registration. The examination consists of a seminar on a suitable subject delivered by the student before the faculty academic adviser (or an approved substitute) and two other members of the faculty selected by the department. Passing the examination, together with satisfactory academic and research work, qualifies the student to apply for Ph.D. candidacy.

4. Research Progress Report: normally before the end of the Winter Quarter of the fourth year inclusive of pertinent graduate study prior to Stanford, the student arranges to give an oral research progress report of approximately 30 minutes, of which a minimum of 10 minutes should be devoted to questions from the Ph.D. reading committee.

5. University Ph.D. Oral Examination: consists of a public seminar in defense of the dissertation, followed by private questioning of the candidate by the University examining committee.

6. Dissertation: must be approved and signed by the Ph.D. reading committee.

*Requirements for item 1b may be totally or partly satisfied with equivalent courses taken elsewhere, pending the approval of the Graduate Study Committee.

ASSISTANTSHIPS

Research assistantships are available for Ph.D. candidates. Information on applying for financial aid is included in the admission packet received
from Graduate Admissions, the Registrar’s Office.

**COURSES**

(AU) indicates that the course is subject to the University Activity Unit limitations (8 units maximum).

150. Applied Quantum Mechanics I—Two-quarter sequence provides a foundation in quantum mechanics for condensed matter physics, solid state electronics, and quantum optics. Basic theory; electronic structure of atoms, molecules, and solids; quantum transitions and the Golden Rule; tunneling; statistical physics, transport and noise. Prerequisites: Physics 45 and 47, or Physics 65, or equivalents.

4 units, Aut (Harrison)

151. Applied Quantum Mechanics II—Energy bands and carrier dynamics, vibrations and the electron-phonon interaction; annihilation and creation operators, phonons, photons and lasers; coherent states, Coulomb effects, angular momentum and spin, shake-off excitations, mesoscopic systems. Prerequisite: 150.

4 units, Win (Harrison)

172. Physics of Solids—(Enroll in Physics 172.)
3 units, Spr (Beasley)

181. Intermediate Optics—(Enroll in Physics 181.)
3 units, Aut (Byer)


207. 3 units, Win (Fox)
208. 3 units, Spr (Fox)

210. Advanced Particle Mechanics—(Enroll in Physics 210.)
3 units, Aut (Peskin)

212. Statistical Mechanics—(Enroll in Physics 212.)
3 units, Spr (Rowson)

215. Numerical Methods for Physicists and Engineers—Review of basic numerical techniques with additional advanced material: derivatives and integrals; linear algebra; linear least squares fitting, FFT and wavelets, singular value decomposition, linear prediction; optimization, nonlinear least squares, maximum entropy methods; deterministic and stochastic differential equations, Monte Carlo methods.

3 units, Spr (Doniach)


3 units (Shen) alternate years, given 1998-99

220,221. Classical Electrodynamics—(Enroll in Physics 220, 221.)

220. 3 units, Aut (Zhang)
221. 3 units, Win (Zhang)

222. Applied Quantum Mechanics I—For graduates; see 150. Prerequisites: Physics 45 and 47, or Physics 65, or equivalents.

3 units, Aut (Harrison)

223. Applied Quantum Mechanics II—For graduates; see 151. Prerequisite: 222.

3 units, Win (Harrison)

230A,B. Quantum Mechanics—(Enroll in Physics 230, 231.)

230A. 3 units, Aut (Chu)
230B. 3 units, Win (Chu)

231A,B. Lasers I and II—(Enroll in Electrical Engineering 231, 232.)

231A. 3 units, Aut (Siegman)
231B. 3 units, Spr (Siegman)


3 units, Aut (Yamamoto)

290. Directed Studies in Applied Physics—Special studies under the direction of a faculty member for which academic credit may properly be allowed. May include lab work or directed reading. any quarter (Staff)

291. Practical Training—Opportunity for practical training in industrial labs. Arranged by student with the research adviser’s approval. A brief summary of activities is required, approved by the research adviser.

3 units, Sum (Staff)
301. Astrophysics Laboratory—(Enroll in Physics 301.)
3 units, Sum (Walker)

304. Lasers Laboratory—Laser theory and practice. Lectures on the theoretical and descriptive background for lab experiments, detectors and noise, lasers (helium neon, beams and resonators, argon ion, cw dye, titanium sapphire, semiconductor diode, and the Nd:YAG). Measurements of laser threshold, gain, saturation, and output power levels. Laser transverse and axial modes, linewidth, and tuning, Q-switching and modelocking. Limited enrollment. Prerequisites: Electrical Engineering 231 and 232, or consent of instructor.
3 units, Win (Byer)

305. Nonlinear Optics Laboratory—Emphasis on laser interaction with matter. The laser devices provide the radiation required to explore the linear and nonlinear properties of matter. Experiments on modulation, harmonic generation, parametric oscillators, modelocking, stimulated Raman and Brillouin scattering, Coherent Anti-Stokes scattering, other four wave mixing interactions such as wavefront conjugation and optical bistability. Optical pumping and spectroscopy of atomic and molecular species. Limited enrollment. Prerequisites: 304, Electrical Engineering 231 and 232, or consent of instructor.
3 units, Spr (Byer)

312. Basic Plasma Physics—For the non-specialist who needs a working knowledge of plasma physics for space science, astrophysics, fusion, or laser applications. Topics: orbit theory, the Boltzmann equation, fluid equations, MHD waves and instabilities, EM waves, the Vlasov theory of ES waves and instabilities including Landau damping and quasi-linear theory, the Fokker-Planck equation, and relaxation processes. More advanced topics are resistive instabilities and particle acceleration. Prerequisites: Physics 210 and 220, or consent of instructor.
3 units (Staff) alternate years, given 1998-99

320. Quantum Optics and Selected Topics in Atomic Physics—(Enroll in Physics 320.)
3 units (Staff) alternate years, given 1998-99

321. Laser Spectroscopy—(Enroll in Physics 321.)
3 units (Staff) alternate years, given 1998-99

324. Introduction to Accelerator Physics—Introduction to basic accelerator physics in linear and circular accelerators. Topics: acceleration, phase stability, transfer matrices, beam envelopes, emittance, and the effects of synchrotron radiation. Topics of current research, including nonlinearities and instabilities.
3 units, Aut (Sietzmann) alternate years, not given 1998-99

325. Electromagnetic Radiation from Relativistic Electrons—For graduate students using such radiation for basic and applied research and students in accelerator physics concentrating on source developments and the study of particle beam characteristics and stability. Electromagnetic radiation from relativistic electron beams, derived from first principles. Coherent and incoherent synchrotron radiation, free electron lasers; undulator and wiggler radiation with linear and elliptical polarization. Recommended: electromagnetism, optics, and special relativity.
3 units (Wiedemann) alternate years, given 1998-99

3 units, Win (Beasley)

346. Introduction to Nonlinear Optics—(Enroll in Electrical Engineering 346.)
3 units, Spr (Harris)

363. Solar and Solar-Terrestrial Physics—Structure, mechanisms, and properties of the sun's interior and atmosphere; solar wind and its variability; solar activity; coronal mass ejections; UV, X-ray, and high-energy particle emission. Earth's magnetosphere. Interaction of the solar wind with the earth's magnetosphere and its terrestrial effects. Sun's electromagnetic radiation effect on the terrestrial environment. Prerequisite: Physics 221 or equivalent.
3 units (Sturrock) alternate years, given 1998-99

366. Introduction to Fourier Optics—(Enroll in Electrical Engineering 366.)
3 units, Aut (Hesselink)

370. Theory of Many-Particle Systems—(Enroll in Physics 370.)
3 units (Staff) alternate years, given 1998-99

3 units, Win (Shen)

373. Solid State Physics: Continuation—Pseudopotentials, the electron-phonon interaction and second quantization. Fermi–Thomas and quantum screening. Transition-metal electronic struc-
APPLIED PHYSICS 309


3 units (Yamamoto)
alternate years, given 1998-99


3 units, Win (Yamamoto)
alternate years, not given 1998-99
physics offered by faculty, students, and outside specialists. (AU)
1 unit, Aut (Beasley)
Win (Beasley, Kapitulnik)
Spr (Kapitulnik)

473. Special Topics in Condensed Matter Physics—Research level discussions of current topics in condensed matter physics. Content varies each quarter and year, depending on the interests of staff and students. Course may be repeated. Offered occasionally.

473A. Condensed Matter Physics—Students undertake background study prior to each weekly seminar offered through 470 as an introduction to topics of contemporary interest in condensed matter physics, critique each seminar for success in oral communication, and present a one-hour seminar on a contemporary topic for critique by the class. Corequisite: 470.
2 units, Aut (Beasley)
Win (Beasley, Kapitulnik)
Spr (Kapitulnik)

483. Optics and Electronics Seminar—Weekly presentations and discussions of current research topics in lasers, quantum electronics, optics, and photonics by faculty, students, and invited speakers. (AU)
1 unit, Aut, Win, Spr (Staff)

AREA ONE PROGRAM

Program Director: Harry Elam (Drama)

The Area One Program is a three-quarter General Education Requirement (GER) for first-year students and expresses the University’s commitment to humanistic inquiry. The purpose of the Area 1 requirement is to build an intellectual foundation in the study of human thought, values, beliefs, creativity, and culture: a foundation that will enrich the students’ understanding of what it means to be human. Area 1 courses enhance skills in analysis, reasoning, argumentation, and oral and written expression, thus helping to prepare students for more advanced work in the humanities, and for work in other areas such as the sciences, social sciences, and engineering.

The Area 1 requirement may be satisfied in a number of different ways:
Cultures, Ideas, and Values tracks (three-quarter course sequences)
Cultures, Ideas, and Values tracks that include an intensive component in written composition (three-quarter course sequences satisfying both the Area 1 requirement and the University writing requirement)
The Program in Structured Liberal Education (an intensive, three-quarter, residence-based program satisfying the Area 1 requirement, the University writing requirement, and one additional General Education Requirement)
Introduction to the Humanities courses (one-quarter introductory courses followed by two-quarter thematic sequences)

CULTURES, IDEAS, AND VALUES

Cultures, Ideas, and Values (CIV) courses broaden an understanding of important ideas and values by focusing on their cultural dimensions: their origins, character, and implications. Each CIV track encourages critical, historically informed discussions of significant contemporary issues, including the impact of ethnicity, class, and gender on cultural identity and on political, religious, and social values. All of the tracks are three-quarter course sequences.

EUROPE AND THE AMERICAS

Track Chair: Mary L. Pratt (Spanish and Comparative Literature)

Europe and the Americas emphasizes the dynamics of culture in the Americas from pre-Columbian times through the European colonial period to the present. It is organized around interlocking themes and concepts rather than a chronological sequence, emphasizing:
How culture is constructed through migration, commercial contact, conquest, colonization, slavery, and immigration
How groups in contact borrow and lend their knowledge, wisdom, and everyday ways of life
How relations of power and resistance are expressed in cultural terms
How groups represent each other and themselves in history
How different groups pose basic questions of human existence, destiny, agency, and meaning

The syllabus combines literary texts with mythology, social theory, philosophy, oral history, religious texts, and historical documents, films, and music.
5 units, Aut (Pratt)
Win (Rosaldo)
Spr (Palumbo-Liu)

GREAT WORKS

Track Coordinators: Renée Courey, J. B. Shank

Great Works offers the opportunity to explore in small discussion sections some of the ideas, beliefs, values, and conflicts in the cultural heritage of contemporary America. Concentrating on classic works of Western literature, religion, and philosophy, it shows how these works contribute to and critique their own immediate contexts and cultures. Works from outside the traditional Western canon are included, giving voice to the plu-
realistic strands in contemporary society, and showing the non-essential nature of many common assumptions. Students learn to question the very designation "great work" as they investigate the different historical, political, and cultural processes that contribute to and flow from such value judgments.

All students attend one lecture each week, given by an expert in the field who introduces the week's reading. The texts are explored in depth in small discussion sections, guided by scholars from a variety of disciplinary backgrounds.

5 units, Aut, Win, Spr (Staff)

EUROPE: FROM ANTIQUITY TO THE PRESENT

Track Chair: Carolyn Chappell (History)

The History track uses works of literature, philosophy, and art to explore crucial problems that have preoccupied thinkers and artists since ancient times:

The ways in which class and gender shape human life
Cross-cultural encounters
The processes by which groups construct a shared identity
The impact of technology
The conflict between freedom and equality

These problems are traced in relation to the major events that have shaped the world in which we live, such as the rise of Christianity and Islam; the European conquest of the New World; the development of modern science; and the impact of political revolutions, industrialization, and modern warfare.

5 units, Aut (Morris)
Win (Chappell)
Spr (M. L. Roberts)

LITERATURE AND THE HISTORY OF IDEAS

Track Chair: Alice Rayner (Drama)

The Humanities track is an interdisciplinary sequence aimed at increasing students' awareness of basic human values (intellectual, social, literary, historical, ethical, and artistic) through the reading and discussion of the best writings from the ancient world to the present, including works from non-European and European traditions. Attention is given to voices that question or even reject perceived values and assumptions. Small discussion sections promote good writing, the exchange of ideas, debate about human issues, and critical and creative thinking.

5 units, Aut (McCall, Staff)
Win (Evans, Staff)
Spr (Eisen, Staff)

ORIGINS, ENCOUNTERS, IDENTITIES

Track Chair: George Collier (Anthropology)

This track is informed by fundamental insights of anthropology:

Culture (collective knowledge, beliefs, and their application in daily life) is central to humanity
Comparative cultural study of all human groups is a key to interpret the acts and comprehend the experiences of other people while understanding general cultural principles
The anthropologist affects and is affected by the society that he or she studies

These insights motivate an interest in cultural products that transcend the bounds of traditional "high culture," and are an approach interested in the contributions of women and marginalized or non-Western people as in those of the elites associated with the tradition of Western culture. Sources of cultural pluralism found in contemporary America are emphasized.

The track explores how culture, language, and civilization have arisen; how people have understood and preserved insights from their past; how they have interacted in the contexts of imperial and colonial expansion; and how they have understood and construed nature, humankind, and their place within the cosmos as groups and as individuals. Emphasis is on the relevance of the classic subfields of the discipline: cultural, linguistic, archaeological, and biological anthropology.

5 units, Aut (Delaney)
Win (G. Collier)
Spr (Yanagisako)

PHILOSOPHY AND HUMAN EXISTENCE

Track Chair: Fred Dretske (Philosophy)

The track emphasizes a philosophical approach to ideas and values. As selected philosophical, scientific, and religious texts and traditions are studied from a variety of perspectives in diverse historical contexts, students are taught to think critically and to understand how social and cultural factors affect thinking. As some of the philosophical roots of American culture are examined, students rethink fundamental values, assumptions, and prejudices. The ability to analyze arguments carefully and to articulate such analysis in writing is stressed.

5 units, Aut, Win, Spr (Staff)
COURSES FULFILLING AREA 1 AND UNIVERSITY WRITING REQUIREMENT

Two CIV tracks, the Literature and the Arts track and the History track, offer the opportunity to fulfill both the Area 1 requirement and the University writing requirement. In Literature and the Arts, all students fulfill both requirements. In the History track, the writing component is optional. In both cases, the writing component requires additional class hours and offers an additional number of units. The Program in Structured Liberal Education (SLE) provides another way to fulfill both the Area 1 and University writing requirements, along with one General Education requirement in the humanities.

LITERATURE AND THE ARTS

Track Chair: David Riggs (English)

Literature and the Arts is interdisciplinary, with emphasis on the relationships among literature, philosophy, history, and the fine arts. Students are encouraged to explore art and literature together as a cultural expression.

The track combines the CIV lectures and discussion sections with intensive writing instruction. Writing sections deepen and enrich an understanding of the arts through writing, and enable students to develop their individual strengths in research and written expression.

Students must complete all 15 units of the 7, 8, and 9 sequence to fulfill the Area 1 requirement, enrolling concurrently in the writing section, if any, paired with their CIV assignment for the quarter. Students who scored 4 or 5 on an English AP exam may fulfill the University writing requirement with a 4-unit Writing and Critical Thinking sequence. Others must complete a 6-unit sequence of writing sections. Depending on writing section assignment and AP status, students in the three-quarter 7, 8, and 9 sequence enroll in a total of 5 to 8 units of Literature and the Arts course work each quarter to fulfill both the University's Area 1 and writing requirements.

5-8 units, Aut (Steidle, Staff)
Win (Riggs, Staff)
Spr (Marsh, Staff)

EUROPE: FROM ANTIQUITY TO THE PRESENT

Track Chair: Carolyn Chappell (History)

See the description of “Europe: From Antiquity to the Present” under Cultures, Ideas, and Values.

Two sections in the Winter and Spring Quarters fulfill both the Area 1 requirement and the University writing requirement. These sections are open only to students who wish to take two quarters of instruction in composition; students with English AP credit cannot be accommodated in this track. Students who choose to take the composition component meet for an additional two hours of writing instruction each week and receive 8 units of credit per quarter in Winter and Spring Quarters. Separate grades are given for the history and writing components of the course.

8 units, Win (Chappell)
Spr (M. L. Roberts)

PROGRAM IN STRUCTURED LIBERAL EDUCATION

Track Chair: Mark Mancall (History)

Structured Liberal Education (SLE) offers students an intensive, three-quarter, residence-based learning experience, which simultaneously satisfies the Area 1 requirement, the University writing requirement, and one General Education requirement in the humanities.

SLE encourages students to live a life of ideas in an atmosphere that stresses critical thinking and a tolerance for ambiguity, living and studying together. The residence hall is the informal setting for lectures and small-group discussions. SLE faculty work with students and participate in dorm life. SLE enhances the classroom experience with other residence-based educational activities: a weekly film series throughout the year and a student-produced play each quarter.

SLE students receive intensive and individualized writing instruction from a team of faculty members and peer writing tutors.

9 units, Aut, Win, Spr (Mancall)

INTRODUCTION TO THE HUMANITIES

Introduction to the Humanities courses provide another way to satisfy the Area 1 requirement. These courses have two parts: a one-quarter introductory course in the Autumn Quarter, and a two-quarter thematic sequence in Winter and Spring Quarters. The Autumn Quarter introductory courses hone skills in humanistic disciplines through a close reading and critical investigation of a limited number of works, as preparation for further work in the humanities and, specifically, for any one of the Winter-Spring sequences described below which students assigned to Autumn Quarter courses take to complete the Area 1 requirement.

AUTUMN

WHY READ IT?

Faculty Team: Keith Baker (History), Harry Elam (Drama), Robert Harrison (French and Italian)

Every great book, be it an epic, a play, a novel, or a philosophical treatise, offers its own justification. The question “Why read it?” can only be answered by reading the book with careful atten-
tion to its claims and context, its philosophical reach, and its literary art. Four books, differing in literary genre and historical era, are read in depth. These works are analyzed from multiple perspectives (historical, philosophical and literary). The goal is to develop the capacity to read rigorously and with a sense of complexity, and to appreciate how inexhaustible a work of the human spirit can be.

5 units Aut (Baker, Elam, Harrison)

THE WORD AND THE WORLD: CONVERSATIONS ACROSS TIME AND SPACE

Faculty Team: Larry Friedlander (English), Timothy Lenoir (History), Haun Saussy (Asian Languages)

The texts read are foundational: they produce social, political, religious, and imaginative worlds. They constitute identities; they imply selves. They define relationships between selves and others, parents and children, women and men, subjects and objects, rulers and ruled, slaves and masters.

These texts are concerned with power's legitimation and its usurpation. They generate authority structures and authority figures, yet their own authority is regularly called into question.

These texts are webs. They present tangled histories of editing, commentary, use, and appropriation, and entangle us in their power, forcing us to ask questions about who we are, what we know, what we do.

They produce words and worlds. They are sites of commentary and analysis, interpretation and critique. Historically, they have been read and reread on their own terms, and in juxtaposition with each other and with other materials chosen to reorient our inquiries. The goal is to develop a rich sense of the texts themselves, as well as critical and interpretive approaches used to explore them.

5 units, Aut (Friedlander, Lenoir, Saussy)

GREAT WORKS I

Track Coordinators: ReneeCourey and J.B. Shank

Great Works I is offered as one of the Autumn Introductory Courses. See the description of “Great Works” under Cultures, Ideas, and Values.

5 units, Aut (Staff)

WINTER-SPRING SEQUENCES

THE ANCIENT MEDITERRANEAN WORLD

Faculty: Ian Morris (Classics)

This two-quarter sequence examines the history of the ancient Mediterranean world, from the origins of complex societies around 3,000 B.C. to the Arab conquests of the 7th century A.D. The Mediterranean was the site of some of the most important social experiments in human history, which profoundly shaped the subsequent development of the whole world. It also has produced one of the longest continuous historical records.

The course focuses on social history, emphasizing ideas of equality in terms of class, gender, and race. It stresses the variety of ways in which people in the Mediterranean have drawn ideological boundaries around and within their communities, and why such apparently permanent social structures changed through time. It also involves cross-cultural comparisons and discussion of geographical contrasts, examining the origins of modern distinctions between Europe, Asia, and Africa, and the extent to which they had a basis in ancient realities.

5 units, Win, Spr (Morris)

MYTH AND MODERNITY

Faculty: Arthur Strum (German Studies), Russell Berman (German Studies)

Myth and Modernity explores the contrasts and interplays between traditional and modern cultures, raising questions about history, progress, and change. What defines a cultural tradition? How do values change? When does a national past sustain or impinge on the present? These questions are posed with reference to German literary and philosophical writings, visual arts, films, and music. Within this cultural field, the focus is on the impact of modernization on values, expressivity, and community. Students are encouraged to assume a critical perspective on their own cultures, via close examination of the constellation of ideas and values that contributed to the German legacy, with its proximity of intellectual achievement and political disaster. How does an obsession with “race” overtake Germany? Do all cultures require such myths, or can mythic thinking be overcome?

5 units, Win (Strum)
Spr (Berman)

GREAT WORKS II-III

Track Coordinators: Renee Courey, J. B. Shank

This is a two-quarter follow-up to any one of the Introduction to the Humanities courses. See the description of “Great Works” under Cultures, Ideas, and Values.

5 units, Win, Spr (Staff)
Director of Graduate Studies in Studio Art: David Hannah
Director of Graduate Studies in Art History: Alexander Nemirov

Professors: Wanda M. Corn (American Art, on leave Winter, Spring), Elliot Eisner (Art Education), David Hannah (Painting, on leave Autumn), Matthew S. Kahn (Design, on leave Spring), Suzanne Lewis (Medieval Art), Richard Randell (Sculpture), Paul V. Turner (Architectural History)

Associate Professors: Kristina Branch (Painting/Drawing), Michael Marrinan (18th-19th century European Art), Jody Maxmin (Ancient Art), Melinda Takeuchi (Japanese Art), Richard Vinograd (Chinese Art)

Assistant Professors: Paolo Berdini (Renaissance Art), Scott Bukatman (Film Studies, on leave Spring), Enrique Chagoya (Painting/Drawing), Leah Dickerman (Modern Art), Pamela Lee (Modern Art), Alexander Nemirov (American Art)

Affiliated Professor: John H. Merryman (Art and Law)

Senior Lecturer: Joel Leivick (Photography)
Lecturers: Bernard Barryte (16th-century Italian and 19th-century British Art), Robert Dawson, Britta Erickson (Chinese Art), Hilarie Faberman (19th- and 20th-century European and American Art), Betsy Fryberger (Prints and Drawings), Lynn Orr (Dutch Art), Thomas K. Seligman (African Art), Ellen Handler Spitz (Modern Art), Patience Young (American Art)

Visiting Professor: Roger Stein (American Art)
Visiting Associate Professor: Hiromitsu Kobayashi (Chinese Art)

The department offers courses of study in: (1) the history of art; and (2) the practice of art (studio), with major concentrations in painting and drawing, sculpture, design, and photography. The undergraduate program of the department is designed to introduce students to the humanistic study of the visual arts. The courses are intended to increase an understanding of the meaning and purpose of the arts, their historical development, their role in society, and their relationship to other humanistic disciplines such as literature, music, and philosophy. The work in classroom and studio is designed to intensify visual perception of the formal and expressive means of art and to encourage insight into a variety of technical processes. The collection of the Stanford Museum and the exhibitions program of the Stanford Gallery supplement the regular academic program of the department.

PROGRAMS OF STUDY

Undergraduates may major in History of Art or the Practice of Art (Studio). A freshman or sophomore intending to major in one of these areas must consult with an adviser appointed by the department to plan his or her course of study. Graduate programs are offered in History of Art and Studio (including Product Design).

HISTORY OF ART

BACHELOR OF ARTS

The major program in the History of Art must include the following:

1. Two courses from Art 1, 2, 3.
2. Forty units in art history courses, of which at least 32 must be at or above the 100 level, including one seminar and one other seminar or colloquium. To ensure that majors have a broad foundation in art history, they are required to take 40 units in at least four of the six following areas: Asian, ancient, medieval, renaissance, baroque, and modern. This distribution still permits the student to take several courses in an area of particular interest.
3. Total units: 50. All required course work, including collateral requirements, must be taken for a grade; they may not be taken Satisfactory/No Credit. University units earned by placement tests or advanced placement work in secondary school are not counted within the 50 units.
4. Collateral Requirements:
   a) Each undergraduate major in the history of art shall take at least one university year of a foreign language or present proof of reading ability in a foreign language. Students who intend to apply to graduate school in art history should become proficient in German and either French or Italian because these are required by most major schools in art history. Students who intend to apply to graduate school in Asian art should take the appropriate Asian language.
   b) Each undergraduate major shall also take two upper-division courses in other departments that relate to his or her work in art history. Students should discuss the choice of these courses with their advisers as early as possible. The adviser must approve the collateral courses before the student registers for them.
   c) Each undergraduate major shall attend an Art library orientation session. Majors are to consult with the Art library staff for scheduling information.
5. Undergraduate majors planning to take courses at an overseas campus must have each course approved by their adviser prior to leaving for the overseas campus.
6. Art majors are required to meet with both their adviser and the undergraduate curriculum adviser during the first two weeks of each quarter to have course work approved and to make certain they are meeting degree requirements.
7. Recommended courses (but which do not count towards the major): Art 40, 50, or 53 and 70.

MINORS
A student declaring a minor in art history must complete 25 units of course work in one of the following four tracks: Open, Modern, Asian, or Architecture. Upon declaring the minor, students are assigned to an adviser with whom they plan their course of study and electives. A proposed course of study must be approved by the adviser and placed in the student's departmental file. No more than two classes may be taken for credit outside of the Stanford campus (this includes the Stanford Overseas Programs).

Requirements for the Open Track: Art 1 plus five lecture courses, colloquia, or seminars in any field.

Requirements for the Modern Track: Art 1 plus five upper-level lecture courses, colloquia, or seminars in any aspect of 19th- and 20th-century art.

Requirements for the Asian Track: Art 2 plus five lecture courses, colloquia, or seminars in Asian art. (Art 1 may be one of the five courses.)

Requirements for the Architecture Track: Art 3 plus five lecture courses, colloquia, or seminars in architectural history. (Art 1 may be one of the five courses.)

HONORS PROGRAM
Art History majors wishing to undertake an individually supervised study in addition to the regular requirements of the major may apply for admission to the honors program. Candidates must have a 3.5 grade point average (GPA) both in the major and overall.

Once a faculty member in Art History agrees to serve as thesis adviser, the candidate submits to the entire Art History faculty a thesis proposal of approximately five pages and a completed paper demonstrating the candidate's writing ability and intellectual capacity. This submission must be made no later than the third week of the Spring Quarter of the junior year. A majority of the faculty must approve the admission of the candidate to the honors program. The student must find two faculty members willing to serve, along with the adviser, as readers of the thesis; at least one of these additional readers must be a member of the Art History faculty. The thesis adviser must be in residence at Stanford during the student's senior year. While working on the honors thesis, the student may register for up to 8 units of Art 240 (Individual Work: Art History); these are in addition to the units required for the major.

The completed thesis must be submitted to the three readers no later than the second week of the student's final quarter of course work. The thesis adviser assigns a grade to the work. The approval of all three readers is required for the thesis to qualify for honors.

MASTER OF ARTS
The Department of Art offers A.M. and Ph.D. degrees. The A.M. is granted as a step toward fulfilling requirements for the Ph.D. The department does not admit students who wish to work only toward the A.M. degree. The University's basic requirements for the master's degree are set forth in the "Graduate Degrees" section of this bulletin.

Completing the University's requirements for an A.B. degree in the History of Art, or equivalent training, is required of students entering a program of study for the A.M. The required curriculum for entering students is determined by the Director of Graduate Studies through an evaluation of transcripts and records during an individual meeting scheduled with each student prior to the opening of Autumn Quarter to discuss course deficiencies.

Requirements for the Degree—The requirements for the A.M. degree in the History of Art are:

1. Residence: completing a minimum of three full tuition quarters or the equivalent in partial tuition quarters of graduate registration.
2. Units: completing a total of at least 36 units of graduate work in the history of art in courses at the 200 level, including a seminar in art historiography/visual theory.
3. Languages: reading knowledge of two foreign languages, preferably German and French or Italian. Students in Chinese and Japanese art are ordinarily expected to demonstrate reading competence in modern and classical Chinese or Japanese depending on the student's area of focus. Final determination is made in consultation with the student's primary adviser.
4. Papers: submission for consideration by the faculty of two term papers from among those written during the year.
5. Area Coverage: demonstration to the faculty, by course work and/or examination, that the student has adequate knowledge of the major areas of the history of art.

DOCTOR OF PHILOSOPHY
The University's basic requirements for the Ph.D. degree are set forth in the "Graduate Degrees" section of this bulletin. The following are departmental requirements:

Residence—To be eligible for the doctoral degree, the student must complete three years of full-time graduate work in the history of art, at least two years of which must be in residence at Stanford.

Unit Requirements—The student must complete at least 99 units of course work with a minimum of 63 units in art history.
**Collateral Studies**—The student is required to take at least three courses in supporting fields of study (such as anthropology, classics, history, literature, or philosophy), determined in consultation with the department advisers.

**Graduate Student Teaching**—As a required part of their training, all graduate students in art history, regardless of their source of funding, must participate in the department’s teaching program. At least two one-quarter assignments in Art 1, 2, or 3 are required. Teaching students must register for the Seminar in Teaching Praxis (Art 295). Students receiving financial aid are required to serve as a teaching assistant for four quarters. Further opportunities for teaching may be available.

**Admission to Candidacy**—A graduate student’s progress is formally reviewed during Spring Quarter of the second year. The applicant for candidacy must complete the requirements governing the A.M. program in the History of Art (see above), and at least an additional 18-24 units by the end of Winter Quarter of the second year. The graduate student does not become a formal candidate for the Ph.D. degree until he or she has fully satisfied these requirements and has been accepted as a candidate by the department.

**Dissertation Proposal**—By the end of the third year, dissertation subjects should be chosen and the proposal written in consultation with the candidate’s adviser. The student forms a Reading Committee consisting of the principal adviser and two other readers. The proposal is submitted to the art history faculty for comments. The student then meets with the Reading Committee to discuss the proposal and faculty comments no later than 30 days after the submission of the proposal, at which time necessary revisions are determined. The proposal is submitted to the adviser for final approval.

**Area Core Requirements**—Every graduate student must participate in at least one 4-unit graded directed reading course or colloquium to acquire and demonstrate a command of current issues in a field. The course results in one of the following: (a) an examination, (b) a series of short critical essays, (c) an annotated bibliography, or (d) a narrative review of the literature. The student and the student’s adviser, or other suitable faculty member(s), agree on a format. If the number of students in a given field permits, this course may be offered as a colloquium.

**Dissertation**—A member of the faculty acts as the student’s dissertation adviser and as chair of the Reading Committee. The final draft of the dissertation must be in the adviser’s hands at least four weeks before the University deadline in the quarter during which the candidate expects to receive the degree. The dissertation must be completed within five years from the date of the student’s admission to the candidacy for the Ph.D. degree. A candidate taking more than five years must apply for an extension of candidacy.

**Oral Examination**—The student forms an Oral Defense Committee (see University guidelines). The oral examination consists mainly of a defense of the dissertation but may range, at the committee’s discretion, over a wider field. The student is required to discuss research methods and findings at some length and to answer all questions and criticisms put by members of the examining committee. Changes, resulting from the committee’s criticism of the manuscript and subsequent examination of the student’s research during the orals, must be incorporated by the student into the final draft of the dissertation for submission to the department as the final requirement for the granting of the Ph.D. degree in History of Art.

**Ph.D. Minor**

For a minor in History of Art, a candidate is required to complete 24 units of graduate-level art history courses (200 level or above), in consultation with a department adviser.

**Joint Ph.D. in Art History and Humanities**

The department participates in the Graduate Program in Humanities leading to the joint Ph.D. in Art History and Humanities. For a description of this program, see the “Humanities Special Programs” section of this bulletin.

**Practice of Art (Studio)**

**Bachelor of Arts**

The major program in the Studio area must total 65 units. Students may major in one of four areas: painting/drawing, sculpture, design, or photography. It is recommended that the basic courses be taken in the freshmen and sophomore years, before declaring a major.

The art history requirement for all studio majors consists of Art 1, to be taken as the basic course before declaring the major, followed by four additional courses. At least one of the courses must be in the modern art series (Art 120A through 121B), and one in the history of non-Western art.

Each undergraduate major is required to attend an Art library orientation session. Majors are to consult with the Art library staff for scheduling information.

**Requirements for Painting/Drawing**

Art 40, 50 or 53, 60
Art 140, 141, 142 (any of the drawing classes may be taken concurrently with Art 145, Painting 1)
18 units of painting courses
Art 1 plus four other art history courses, including one in the modern art series (Art 120A
ART 317 through 121B) and one in the history of non-Western art
8 units of electives with the adviser's approval
Total units required: 65

REQUIREMENTS FOR SCULPTURE
Art 40, 50 or 53, 60, 70
Art 140, 141, 142 (two quarters required)
18 units of sculpture courses
Art 1 plus four other art history courses, including one in the modern art series (Art 120A through 121B) and one in the history of non-Western art
7 units of electives with the adviser's approval
Total units required: 65

REQUIREMENTS FOR DESIGN
Art 40, 50 or 53, 60, 70
Art 1 plus four other art history courses, including one in the modern art series (Art 120A through 121B) and one in the history of non-Western art
Mechanical Engineering 101 plus one other Mechanical Engineering course at or above the 101 level
Art 64, 160, 161, 166, 167 (intermediate design)
Art 261, 268 (advanced design)
Art 140, 145, or 150 (one quarter required)
Total units required: 65

REQUIREMENTS FOR PHOTOGRAPHY
Art 40, 50 or 53, 60, 70
Art 140, 141, or 142 (one quarter required)
Art 148
15 units of photography courses
Art 1 plus four other art history courses, including one in the modern art series (Art 120A through 121B) and one in the history of non-Western art
10 units of electives with the adviser's approval
Total units required: 65

A major in studio may take Satisfactory/No Credit units in courses outside the 65 units required for the major area of interest.
Students are required to meet with both their adviser and the department’s undergraduate curriculum adviser during the first two weeks of each quarter to have course work approved and to make certain they are meeting degree requirements. Failure to do so will result in the withholding of registration for that quarter.

Overseas Campus Credit for Studio Art Courses—A minimum of 52 of the 65 units required for the studio art major must be taken at the Stanford campus. This allows a student to take art courses at an overseas campus, but still requires that the bulk of the work be done under the guidance of an adviser and an approved curriculum. In all cases, a student should meet with his or her adviser before planning an overseas campus program.

Transfer Credit Evaluation—Upon declaring a studio art major, a student transferring from another school must have his or her work evaluated by a Department of Art adviser. A maximum of 13 transfer units are applied toward the 65 total units required for the studio art major. This allows a student to receive some credit for course work completed elsewhere, but still requires that the bulk of the work be done under the guidance of an adviser and an approved curriculum. A student wishing to have more than 13 units applied toward the major must submit a petition to the adviser and then have his or her work reviewed by a studio committee.

MINORS
The studio minor is divided into two tracks: (1) two-dimensional studies and (2) three-dimensional studies. Each student who declares a studio minor is assigned an adviser in one of these areas. The student is required to submit a proposal outlining a course of study to his/her adviser, who works closely with the student to formulate a cohesive program in which the art history component is well defined in regard to the student’s focus. A minimum of 31 units is required for the minor. A student may allocate 1 to 3 units for independent study work. These units are in addition to the 31 units required for the minor.

Requirements for Two-Dimensional Studies in Painting/Drawing, Photography, Two-Dimensional Design: Art 60, 140, plus four electives in studio art; Art 1 plus two electives in art history.
Requirements for Three-Dimensional Studies in Sculpture, New Genres, Three-Dimensional Design: Art 50 or 53, 60, plus four electives in studio art; Art 1 plus two electives in art history.

MASTER OF FINE ARTS
Programs for the M.F.A. degree are offered in painting, sculpture, new genres, photography, and product or graphic design.

Graduate Program in Painting, Sculpture, New Genres, and Photography—The program provides a rigorous and demanding course of study designed to challenge and encourage advanced students. Participants are chosen for the program on the basis of work that indicates artistic individuality, achievement, and promise. Candidates should embody the intellectual curiosity and broad interests appropriate to, and best served by, work and study within a university context.

Admission—Admission to the M.F.A. degree program requirements:
1. Applicants must have an A.B. or B.S. from an accredited school. It is expected that the applicant have a strong background in studio art,
either an undergraduate degree or at least three years of independent studio practice.

2. Applications and portfolios for the studio program must be submitted by January 1. Students accepted to the program are admitted for the beginning of the following Autumn Quarter. No applicants for mid-year entrance are considered.

3. Portfolio Specifications: 20 slides of creative work. Some of these can be drawings if relevant to the overall project. Send in a Kodak Universal carousel; no actual work is accepted. All slides must be labeled with the applicant’s name and an accompanying slide list must be included indicating the size, date, and medium of each work. If the applicant wants the portfolio returned, a stamped, self-addressed container must be included.

Requirements for the Degree—The requirements for M.F.A. degree in painting, sculpture, new genres, and photography are:

1. Completing a minimum of two years (six quarters) of graduate work in residence or its equivalent at Stanford.

2. Completing 48 units of study. Students must discuss their programs of study with the department’s Senior Administrator to ensure that the most favorable registration arrangement is made.

3. Six quarters of the Master’s Project, which includes two weekly seminars (the Object Seminar and the Concept Seminar) and Studio Practice, which is an individual tutorial with a selected member of the faculty. In addition, three courses of academic electives are required to be taken in the first year. These courses can be chosen from a large variety of disciplines in consultation with the faculty adviser.

4. The student is expected to pass three faculty reviews: (1) at the end of the first quarter (anyone judged to be making inadequate progress is placed on probation and will require an additional review at the end of the second quarter), (2) at the end of the third quarter, (3) at the time of the M.F.A. exhibition. The purpose of these reviews is to evaluate development and to assess the progress of the student.

5. During the final quarter in the program, students must write a thesis paper addressing the development of their work over the two-year period at Stanford. Participation in the M.F.A. exhibition at the end of the year is required.

6. All students, regardless of their source of funding, are required to assist with the department’s teaching program for a minimum of eight hours per week over the period of six quarters; the particulars of this assignment are at the department’s convenience.

The studio faculty reserves the right to make use of graduate paintings, sculpture, and photographs in exhibitions serving the interests of the graduate program.

Graduate students must remain in residence at Stanford for the duration of the program.

The Graduate Program in Design—Working jointly, the Departments of Art and Mechanical Engineering offer graduate degrees in product and visual design. A large new physical environment, the Design Yard, provides professional caliber studio space and well-equipped shops. Flexible programs may include graduate courses in fields ranging from graphic design to engineering design, typography to biotechnology, marketing to microcomputers. The program centers on a master’s project and may also include work in advanced art and design. The program is structured to balance independent concentration with rich utilization of the University and the community, and personal interaction with the students and faculty of the graduate Design program. Cross-disciplinary interaction is encouraged by a four-person graduate design faculty.

An A.M. degree with a specialization in design is offered to qualified students who prefer to participate in the graduate program for only one year.

Admission—Admission to the M.F.A. degree program requires:

1. Applicants must have an A.B. or B.S. from an accredited school. It is expected that the applicant have a strong background in studio art, either an undergraduate degree or at least three years of independent studio practice.

2. Portfolio Specifications: twelve slides or photographs of creative work. All slides must be labeled with the applicant’s name; if a carousel is sent, an accompanying slide list must be included indicating the size, date, and medium of each work; otherwise, slides should be labeled with the same information and sent in the standard cardboard box received from processing. If applicants want portfolios returned, a stamped, self-addressed container must be included.

Requirements for the Degree—The requirements for the M.F.A. degree with a specialization in design are:

1. Completing a minimum of two years (six quarters) of graduate work in residence or its equivalent at Stanford.

2. Completing in the first year 54 units of course work chosen in consultation with an adviser. At least 18 of the 54 units must be in Art 360A, B.C and Mechanical Engineering 211A, B.C.

3. Participating in a weekly seminar in which their work is criticized and discussed in detail.

4. As a part of their training for the M.F.A. degree, all students, regardless of their source of funding, are required to assist with the department’s teaching program for a minimum of eight hours per week over the period of six
quarters; the percentage of work assigned in a given quarter is at the department's conve-
nience.

Graduate students must remain in residence at Stanford for the duration of the program.

**ART EDUCATION**

Information concerning the A.M. in Teaching, Doctor of Education, Ph.D. in Education, and Teaching Credential (Single Subject-Secondary) degrees and programs may be secured from the Office of the Dean of the School of Education.

**COURSES**

(WIM) indicates that the course meets the Writing in the Major requirements.

**HISTORY OF ART**

**BASIC**

1. *Introduction to the Visual Arts*—Introduction to the critical problems of understanding, analyzing, and writing about the visual arts. Approach is multicultural and topical rather than historical. Discussion sections. GER:3a (DR:7) (WIM)

   5 units, Aut (Lee)  
   Spr (Lewis)

2. *Ideas and Forms in Asian Art*—The religious and philosophical ideas and social attitudes of India, China, and Japan and how they are expressed in the architecture, painting, woodblock prints and sculpture, and in such forms as garden design and urban planning. Discussion sections. GER:3a,4a (DR:2 or 7) (WIM)

   5 units, Win (Vinograd)

3. *Introduction to the History of Architecture*—Selective survey of architecture from antiquity to the 20th century. Mostly Western with some non-Western topics. For each period, specific buildings and general principles relevant to the study of architecture are examined. Discussion sections. GER:3a (DR:7) (WIM)

   5 units, Spr (Turner)

11. *Introduction to Ancient Art*—Survey of the arts of Greece and Rome emphasizing architecture, sculpture, and painting, and the broader cultural context in which they flourished.

   4 units (Maxmin) not given 1997-98

12. *Theme and Style in Japanese Art*—Selected topics, presented chronologically, illuminating central artistic movements, monuments, and issues in their cultural context from prehistoric times to the 19th century. GER:3a (DR:7)

   4 units, Spr (Takeuchi)

13. *Introduction to Chinese Art*—Topics in Chinese art from the Neolithic to the 20th century. Emphasis is on recent archaeological discoveries, newly published material, and current issues of understanding and interpretation.

   4 units (Vinograd) not given 1997-98

**INTERMEDIATE**

100A/200A. *Archaic Greek Art*—The development of Greek art from Protogeometric beginnings to the decades preceding the age of Pericles. GER:3a (DR:7)

   4 units, Aut (Maxmin)

100B/200B. *Classical and Hellenistic Greek Art*—The formation, in 5th-century Athens, of the classical ideal and its development and diffusion in the centuries that followed. GER:3a (DR:7)

   4 units, Win (Maxmin)

100C/200C. *Roman Art*—Introduction to the rich and varied art and architecture of Rome from the Etruscans to the Late Empire. GER:3a (DR:7)

   4 units, Spr (Maxmin)

102/202. *Greek Painting*—Introduction to the study and appreciation of Greek vases and their painters, especially the masters of Athenian black- and red-figure who flourished in the culturally rich and volatile era of the tyrant Peisistratos and his sons.

   4 units (Maxmin) not given 1997-98

105/205. *Sites and Images of Power in 12th-Century Europe*—Romanesque art and architecture in Western Europe from c. 1095 to 1200. Structuring a new visual discourse to shape and respond to experiences of political, spiritual, and intellectual expansion—Crusade, pilgrimage, and new learning in the schools. How spatial environments are built and systems of visual discourse are designed within the ideological contexts generated by monastic and feudal institutions in centers such as Cluny, Citeaux, Moissac, Mont Saint-Michel, Vézelay, Winchester, Canterbury, Durham, Santiago de Compostela, and Monreale. GER:3a (DR:7)

   4 units, Aut Lewis)

107/207. *Age of Cathedrals*—Gothic art and architecture in Western Europe from c. 1150 to 1500. Structuring a "modern" visual discourse within the ideological framework of a new monarchical Church and State, emerging towns and universities, the rise of literacy, the cultivation of the self, and the consequent shifts in patterns of art patronage, practice and reception in Chartres, Paris, Bourges, Strasbourg, Canterbury, London, Oxford, and Cambridge.

   4 units (Lewis) not given 1997-98

108/208. *Late Medieval "Realism": 15th-Century French and Netherlandish Painting*—Restructuring representation and reception in the art of the Limbourg brothers, Van Eyck, Van der Weyden, Van der Goes, Fouquet, and Bosch. The shift from court patronage to entrepreneurial art markets; the new status of the image, artist, viewer, and self; and the problematical premodern context of the end of the Middle Ages.

   4 units (Lewis) not given 1997-98
110A/210A. Early Renaissance Painting, 1400-1490—Survey of 15th-century painting in light of the artistic practices and cultural attitudes that characterized the visual culture of Florence. The circumstances of patronage, secular and religious, offers the framework through which artistic episodes of Renaissance imagery, from the revival of antiquity to Christian neo-Platonism, find historical explanation. Works by Masaccio, Masolino, Beato Angelico, Filippo Lippi, Paolo Uccello, Ghirlandaio, Piero di Sozimo, Mantegna, Piero della Francesca, Botticelli, and Leonardo. 4 units (Berdini) not given 1997-98

110B/210B. High Renaissance Painting, 1490-1570—Survey of 16th-century painting in light of notions of classicism practiced in Rome, Tuscany, and Emilia. A visual ideology aimed at producing a "mutual supplementation between viewing nature and forming ideas," Renaissance classicism as a novel attitude towards art which identified the world of ideas with a world of heightened realities. Works by Leonardo, Michelangelo, Raphael and his school, Andrea del Sarto, Pontormo, Rosso, Bronzino, Correggio, and Parmigianino. 4 units (Berdini) not given 1997-98

110D/210D. The Venetian Renaissance—Vene- tian painting of the Renaissance in light of the exchange between center and periphery that characterizes Venice's visual culture. After the acquisition of land dominions, the terraferma, in the first half of the 15th century, Venice the center, promoted forms of interaction (social, political, and cultural) among the diverse regions of the periphery. By renewing, absorbing, and valorizing the characteristics of the local schools of painting, Venice realized its own Renaissance. The pictorial genre of the pastoral is a typical reception between the urban center and the agrarian periphery. Focus is on the works of Carpaccio, Bellini, Giorgione, Savoldo, Lotto, Titian, Veronese, Bassano, and Tintoretto. 4 units (Berdini) not given 1997-98

110E/210E. The Bauhaus—The Bauhaus was an artistic idea, a school, and a social project. Its original curriculum was conceived by architect Walter Gropius in Weimar, Germany, at a time when architecture, painting, sculpture and the applied arts were theorized and practiced under a common aesthetic and social agenda. Throughout its brief, but intense life (1919-1933), the Bauhaus promoted a variety of artistic experiences that explored in different media the relationship between form and technique. Avant-garde and institutional, the Bauhaus constructed a unique visual culture of modernity grounded in experiment and rationality. Examines pedagogic principles, artistic theory, and practical activity of the school's individual laboratories (architecture, design, photography, graphics, tapestry). GER:3a (DR:7) 4 units, Aut (Berdini)

111/211. Baroque Painting—The visual culture of Italy, France, and Spain from 1590 to 1660, focusing on the works and legacies of Carracci, Caravaggio, Guercino, Guido Reni, Poussin, and Velasquez. Theoretical issues (e.g., Naturalism). Emphasis is on what constitutes a Baroque image and what are the conditions of its beholding. 4 units (Berdini) not given 1997-98

111A/211A. Renaissance Women—Ways in which models of feminine beauty were constructed and processed in the literary and visual culture of the Renaissance. Whether in the guise of goddesses, courtesans, or others, the feminine image partook of a discursive arena in which its social mythological, and erotic valencies required readers and beholders to evolve new forms of response. Reception theory and gender studies offer the theoretical framework for discussing artistic forms from Titian's paintings to Petrarchan poetry. 4 units (Berdini) not given 1997-98

120A/220A. 18th-Century Art in Europe, ca. 1660-1780—The major developments in painting across Europe from the High Baroque illusionism of Bernini (Rome) and the founding of the French Academy (Paris) to the international revival of antiquity during the 1760s, with parallel developments in Venice, Naples, Madrid, Bavaria, and London. Lectures situate shifts in themes and styles amidst the emergence of new viewing publics. Artists: the Tiepolos, Giordano, Batoni, and Mengs; Ricci, Pellegrini, and Thornhill; Watteau and Boucher; Chardin and Longhi; Reynolds and West; Hogarth and Greuze; Vien, Fragonard, and the first works by David. Additional hour discussion each week for graduate students. 4 units (Berdini) not given 1997-98

120B/220B. Painting in the Age of Revolution—Survey of painting in Europe within the context of the French Revolution and its aftermath. Lectures align ruptures in the traditions of representation with respect to shifting social formations and political events. Artists: David and his students; Gros and the painters of Napoleon; Gericault; Blake, Fuseli, and Goya; Turner and Constable; Friedrich, Runge, and the Nazarenes; Ingres and Delacroix. Additional hour discussion each week for graduate students. 4 units (Marrinan) not given 1997-98

120C/220C. The Age of Naturalism, ca. 1830-1874—The origins, development, and triumph of naturalist painting in Europe. Lectures underscore the creative tensions between the traditional ambitions of painting and the challenge of new "modern" subjects and the emerging practice of working in the open air. Artists: Corot, Rousseau, and the painters of Barbizon; Courbet, Millet, and Daumier; the Pre-Raphaelites; Manet and his circle; the early works of...
Monet, Renoir, Degas and friends. Additional hour discussion each week for graduate students.

4 units (Marrinan) not given 1997-98

120E/220E. Post-Naturalist Painting—How conceptual models from language, literature, new technologies, and scientific theory affect picture-making following the collapse of the radical naturalism that characterized European painting of the 1860s and early '70s. Bracketed in France by the first Impressionist exhibition (1874) and the first public acclamation of major canvases by Matisse and Picasso (1905), explores related developments in England, Germany, and Austria. Artists: the Impressionists and Cezanne; Moreau, Redon, and Rops; Van Gogh and the Fauves; Gaugin, Les XX, and Munch; Seurat and Signac; Puvis de Chavannes, Burne-Jones, Whistler and Klimt; Horta, van de Velde and Guimard; Beardsley, Vallotton, and Toulouse-Lautrec. Additional hour discussion each week for graduate students. Recommended: some prior experience with 19th-century art. GER:3a (DR:7)

4 units, Spr (Marrinan)


4 units (Lee) not given 1997-98

121/221. Abstract Expressionism—The painting and sculpture of the major Abstract Expressionist artists 1935-59 (Jackson Pollock, Willem de Kooning, Franz Kline, Mark Rothko, and Adolph Gottlieb); and artists reacting to Abstract Expressionism (Ad Reinhardt, Jasper Johns, and Robert Rauschenberg). Emphasis on works of art, and the cultural and political context in which these works were made. GER:3a (DR:7)

4 units, Aut (Nemerov)

121A/221A. Rebellion, Revolution, and Reaction: European Art between the Wars (1918-1939)—Examines historical avant-garde movements (Dada, Russian Constructivism, and Surrealism) in conjunction with important anti-modernist tendencies such as Socialist Realism and Nazi Art. Issues: artistic responses to wartime trauma; attempts to develop the progressive potential of technology and the political utility of art; and to reorder relations between the body and the machine, the art object and the commodity, and private and public life. Artists: Richter, Heartfield, Höch, Tzara, Rodchenko, Tatlin, Bellmer, Man Ray, and Ernst. Readings: the modern subject, mass culture, the modernism/anti-modernism debates of the 1930s, and the uses of art in totalitarian regimes.

4 units, Win (Dickerman)

123/223. Art and Technology—Introduction to the thematic of technology as it has been treated through modern art. Beginning with the invention of photography and ending with recent visual practices, considers the relationship between technology, industrialization, mass culture, communication, and social engineering and control. Emphasis is placed less on "machine aesthetics" than the issue of technological rationality, e.g., the art of the last 30 years (kinetic art, video, digital photography, etc.). Recommended: some familiarity with modern art. GER:3a (DR:7)

4 units, Spr (Lee)

126A/226A. Introduction to the Study of Chinese Painting—Issues and approaches to the study of Chinese painting and related pictorial arts. Introduction to major genres, styles, and techniques; problems of subject matter and significance; the social and institutional contexts of painting; painting theory and critical standards; and painters' lives and cultural roles. Critical readings and discussions of representative studies.

4 units (Vinograd) not given 1997-98

126B/226B. Early Chinese Pictorial Art—Major developments in the pictorial art of early Imperial China, Han through Sung dynasties. Emphasis on recent archaeological discoveries, the appearance of a theoretical and critical literature for painting, and the diversity of functions and conceptions of painting in the Sung period.

4 units (Vinograd) not given 1997-98

126C/226C. Artists and Systems in Later Chinese Painting—Survey of major Chinese artists A.D. 1300-1900 in the context of changing systems of patronage, art theory, and image production. Focuses on the literati, individualists, court artists, and urban painters of later Imperial China.

4 units (Vinograd) not given 1997-98

126D/226D. Landscapes, Geographies, and Ideologies: Intercultural Perspectives—Comparative issues in the understanding of landscape arts, focusing on E. Asian and European/American traditions. Paintings, gardens, site-specific art, and literature utilize approaches drawn from art history, cultural geography, and literary studies. Topics: conceptions of landscape and nature; social and economic contexts of landscape production; ideological and textual constructions of landscape.

4 units (Vinograd) not given 1997-98

126E/226E. Across Cultures: Encounters of Eastern and Western Art—Crosscultural interactions and appropriations between the art of E. Asia, Europe, and America from the 16th century to the
present, Artistic interchange in the context of culturally based attitudes toward visual representation, imagery, and the idea of the foreign.
4 units (Vinograd) not given 1997-98

129/229. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868—Castles, residences, temples, painting, prints, ceramics, and gardens of Momoyama and Edo Japan. The social, economic, and ideological forces that brought about the genesis, evolution, and demise of specific forms.
4 units (Takeuchi) not given 1997-98

129A/229A. Painting in Late Medieval and Early Modern Japan, 1500-1868—The appearance, development, and interaction of the various courtly, military, and popular traditions of Japanese painting. Emphasis is on questions of social meaning, patronage, and historical circumstance. GER:3a (DR:7)
4 units, Win (Takeuchi)

4 units (Nemerov) not given 1997-98

4 units (Nemerov) not given 1997-98

130B/230B. Transatlantic Modernism: Paris and New York in the Early 20th Century—Modernism in the American arts at home and abroad emphasizing transatlantic expatriation, cultural politics, and creative alliances. Painters and sculptors are the focus; also the literary figures who interacted with artists (Gertrude Stein, William Carlos Williams, and Langston Hughes). Topics and artists: the Armory Show, Marcel Duchamp, Francis Picabia, Futurism, Fernand Léger, Alfred Stieglitz, Charles Demuth, Georgi O’Keeffe, Gerald Murphy, the Harlem Renaissance, John Storrs, and Florine Stettheimer. Discussion sections.
5 units (W. Corn) not given 1997-98

130C/230C. Around 1900: The Visual Arts in America—Survey of major American artists working at the turn of the century (George Bellows, Thomas Wilmer Dewing, Thomas Eakins, Childe Hassam, Winslow Homer, Abbott Thayer, and John Twachtman). Emphasis is on examining the works in relation to turn-of-the-century political practices and discourses: imperialism, immigration, neurotism, and nostalgia, etc.; and in relation to practices and discourses of representation, including the advent of film. GER:3a (DR:7)
4 units, Win (Nemerov)

4 units (Nemerov) not given 1997-98

130F/230F. Romantic Landscape Painting in America, 1825-1875—The art of Thomas Cole and the Hudson River School. Emphasis is on American literature and British aesthetic theory, and on questions of patronage, industrialization, and tourism.
4 units (Nemerov) not given 1997-98

131. The Arts of Africa—Introduction to the arts of several black sub-Saharan African cultures (ancient Nigeria; the cultural and aesthetic traditions of coastal and Sudanic Africa, including the Yoruba, Igbo, Dogon, and Senufo). Artistic traditions are placed within their social context and viewed as part of myth, ritual, music, dance, and world view.
4 units, Spr (Reid)

134/234. A History of Photography—Surveys photography from its invention in the 19th century to the present, focusing on critical points of historiographic debate: new representations of war and the birth of photojournalism in the Crimean conflict and the American Civil War; picturing the Other in 19th-century travel photography; the sexualization of domestic relations in Victorian amateur photography; representing time in motion studies (Muybridge, Marey); interpreting Atget; photography as revolutionary practice (Heartfield, Rodchenko); Frank, DeCarava, Arbus and new imagings of America; and issues in contemporary photography. Working from images in the collection of the Stanford Museum, the San Francisco Museum of Modern Art, and important primary and critical texts, focuses on the nature of photographic representation and the changing status of photography as an artistic and social practice.
4 units, Spr (Dickerman)
Raphaelitism, Aestheticism, and British Impressionism. Topics: the viability of abstraction after Abstract Expressionism (Hardedge abstraction, Minimalism, and Process Art); the role of commodity and popular culture in artistic production (Warhol and Pop Art in America, the Independent Group in Great Britain, the Situationist International in France); the emergence of performance art and other new art forms (Fluxus, the Happenings, Earth Art, Video, Kinetic Art); the function of language and the nature of art-as-idea in Conceptual Art; and the relationship between art and political activism in regards to the anti-war movement, feminism, and civil rights. Recommended: some knowledge of 20th-century art history.

4 units (Lee) not given 1997-98

140/240. Introduction to Film Study—(Same as Comparative Literature 140.) The formal, historical, and cultural issues associated with the study of film. Familiar models of classical narrative cinema are juxtaposed with alternative narrative structures, documentary films, and experimental cinematic forms. Issues of cinematic "language," visual perception, and representations of gender, ethnicity, and sexuality. Develops basic relevant aesthetic and conceptual analytical skills. Weekly screenings. Recommended: 140 or its equivalent.

4 units, Aut (Bukatman)

141/241. Cinema and the City—(Same as Comparative Literature 141.) Changing understandings of urban space over time are illustrated by reviewing a range of films from the past century. The cinematic city is an arena of social control, social liberation, collective memory, and complex experience. Cinematic effects (montage, movement, and subjective camerawork) are integral to understanding the city as a lived environment. The rise and decline of the utopian precepts of architectural modernism and the representation of the city into the realm of cyberspace, where it still functions as a site of navigation, perception, and self-redefinition. Weekly screenings. Recommended: 140 or its equivalent.

4 units, Win (Bukatman)

150/250. Victorian Art and Society—Meaning and varieties of Victorian art, emphasizing painting from the 1830s to WW I, and focusing on Pre-Raphaelitism, Aestheticism, and British Impressionism. Topics: emergence of new art institutions, audiences, and patronage; the role of the artist and art critic in society; and the relationship of British art to painting on the Continent and in America. Study of artists such as Rossetti, Whistler, Leighton, and Beardsley, and trends such as social realism and classicism.

4 units, Aut (Faberman)

151/251. The Rediscovery of "Old New England," 1865-1945—As New England became a heavily industrialized region, writers and artists sought to recover, sustain, and construct its older, traditional values. Was this a "Colonial Revival" or a regional recasting of our national goals? Winslow Homer, Eastman Johnson, Childe Hassam and the impressionist painters, the sculptors St. Gaudens and French, etc., were joined by writers (Howells, Sarah Orne Jewett, and Mary Wilkins Freeman) in arguing this out as Longfellow, Whittier, and Emily Dickinson became "Household Poets."

4 units, Spr (Stein)


4 units (Turner) not given 1997-98

175A,B/275A,B. Modern Architecture I, II—Two-quarter tracing of the developments, largely in Europe and starting in the 18th-century, which led to the present state of architecture and urban design. Emphasis is on the architects' and planners' responses to new materials, technology, and cultural conditions.

4 units each (Turner) not given 1997-98

201. Graduate Seminar: Political Iconography—Study of 6th-century painters and the extent to which their work can be seen to reflect the history and political shenanigans of their age. Prerequisite: 100A or 102.

4 units (Maxmin) not given 1997-98

202. Undergraduate Colloquium: Greek Art—(Same as Classics 120A.)

4 units, Aut (Maxmin)

202B. Graduate Seminar: Greek Vase Painting

4 units (Maxmin) not given 1997-98

202C. Undergraduate Colloquium: Ancient Art

4 units (Maxmin) not given 1997-98

206A. Seminar: Manuscript Illumination—Readings, discussion, and critical analyses centered on the production and consumption of the illustrated book in the Middle Ages within the framework of textually generated concepts of visual perception and experience. Topics: genres of texts, literacy and reader response, semiotics, pictorial exegesis, ownership and patronage, codicology, paleography, and the role of the artist vs. the designer of the book.

4 units (Lewis) not given 1997-98
206B. Seminar: Medieval Narrative—Visual and intertextual strategies and structures in some major medieval narrative cycles in mural and manuscript illustration, within the context of current critical theory.

4 units (Lewis) not given 1997-98

206C. Colloquium: Power of Image as Icon—Late Roman and Byzantine Art and Architecture—The formation of a new visual discourse from Constantine (4th century) to the Turkish conquest of Constantinople (1452). Artistic traditions (mosaics, icons, manuscript illumination) and building types centered on patterns of reception, ideology, and patronage in Rome, Ravenna, Istanbul, Mt. Sinai, the Balkans, and Sicily.

4 units (Lewis) not given 1997-98

206D. Colloquium: Multiculturalism and Image Appropriation—Early Medieval Art and Architecture—Western Europe from c.700 to 1095 centered on the Celtic, Anglo-Saxon, Carolingian, Ottonia, and Spanish Mozarabic phases of hybrid cultural formation and the creation of such works as the Book of Kells, the Sutton Hoo treasure, and the plan of St. Gall. In a period of social upheaval and political fragmentation, new modes of visual discourse emerged, and remnants of the late classical tradition survived within larger ideological patterns of assimilation and change.

4 units (Lewis) not given 1997-98

214A. Seminar: Modified Expectations—Caravaggio and the Beholder—Contrary to academic theory, in which an image should present the beholder with an experience of higher moral value, Caravaggio's paintings, religious or profane, offer no edifying exempla. They modified the beholder's expectations, and were perceived as a betrayal of artistic ethics. To the classicist Poussin, Caravaggio had destroyed painting. Yet, in the process of defying the ideals of painting, Caravaggio's work discloses dimensions of beholding, and of the beholder. Focusing on interpretive strategies from reception theory to psychoanalysis, explores the historical and theoretical circumstances of beholding Caravaggio's images.

4 units (Berdini) not given 1997-98

214B. Seminar: Humanistic Discourse on Art—The linguistic and literary modes devised by the humanists of the 15th century to account for visual experience. How the humanist form of attention, expectations, and color structure, etc. elucidating the emergence of two distinctive modes which condition subsequent discourse on art: the narratival and the descriptive. Texts by Cennini, Alberti, Guarino, Ficino, Fazio, and Leonardo, and the contemporary reception of Pliny the Elder, Philostratus, Cicero, Quintillian and Horace.

4 units (Berdini) not given 1997-98

214C. Seminar: The Pastoral Vision in the Renaissance—Whether secular or profane, nostalgic or premonitory, the encounter with the other offered by the voluntary retreat into the countryside fostered an artistic genre that only the combined representational naturalism and classical revivial of letters pursued during the Renaissance could accomplish. A multimedia discursive field, the pastoral offered a hermeneutic experience that exposed (and continues to expose) the social, gender, and ideological prerogatives of readers and beholders. Discussing the cultural and phenomenological implications of images like Giorgione's Tempest, critical and art-historical models of interpretation are tested from iconology to semiotics.

4 units (Berdini) not given 1997-98

215. Seminar: Michelangelo and the Aesthetics of the Unfinished—Michelangelo's sculptures were often left in a state prior to completion, so as to reveal the process and the results of their making. It was left to the beholders to complete these works in their imagination, and in this regard the artist’s sonnets, letters, and Neoplatonic conceptions offered critical instruction. For the reader-beholder, Michelangelo's poetry, sculpture, and related drawings constitute a complex aesthetic unity. Readings from Michelangelo's sonnets and letters, art theory, and Platonic and Neoplatonic works.

4 units (Berdini, Harrison) not given 1997-98

215S. Undergraduate Majors Seminar: Renaissance Rome—Art and Ideology in the Age of Julius II (1503-13)—The role played by Bernaince's, Michelangelo's, and Raphael's art in shaping Julian Rome. The papal attempt to revise the dual foundation of Rome, i.e., classical antiquity and Early Christianity. Architecture, painting, and sculpture contributed toward construction of a new visual culture for a New Rome, a city destined to be the center of Christianity and the capital of an absolutist state. Antiquarian studies, monarchical ideologies, humanistic discourses, and the new artistic practices were experimented with throughout Italy in the previous century, and shaped a pontifical project which succeeded artistically but failed ideologically, as the subsequent divisions within Christendom demonstrated.

4 units, Win (Berdini)

221C. Seminar: Aspects of Realism in 19th-Century Painting

4 units (Marrinan) not given 1997-98

221H. Undergraduate Seminar: Paul Cezanne

4 units (Marrinan) not given 1997-98
223D. Seminar: Site Specific and Installation Art—Drawing on precedents in early 20th-century art (De Stijl, the Bauhaus, the Russian and Soviet Avant-Garde, Schwitters), considers the thematic of place in the production and reception of site-specific work, art made for, and bound to, a particular place. Topics: the legacy of the Gesamtkunstwerk, the notion of community and the public sphere, the viewer of art as phenomenological body, the body as site, the politics of liminal space, and the critique of the museum and gallery as institutions. Artists: Smithson, Heizer, Morris, Serra, Situationist International, Antin, Piper, Asher, Buren, Matta-Clark, Broodhaers, Haacke, Wilke, Gonzalez-Torres, Holzer, Green, Wodiczko, the Border Arts Collective, Wilson, Luna, Mendieta.

4 units (Lee) not given 1997-98

224A. Seminar: Collage/Montage—Examines case studies in collage and montage practice (including Cubist collage, the films of Dziga Vertov and Sergei Eisenstein, the photomontages of Hannah Hoch and John Heartfield, and the early work of Robert Rauschenberg) and the historiographical problems that this work engenders in conjunction with important 20th-century theories of fragmentation and recombination including Walter Benjamin's conception of allegory; Claude Levi-Strauss on primitive culture; systems of production, exchange, andpossession; and gender-implicated imagery.

4 units, Spr (Dickerman)

227F. Colloquium: New Studies in Chinese Art—Critical readings of current studies of Chinese art, focusing on Ming and Qing period pictorial arts. Emphasis is on issues of political and cultural authority; systems of production, exchange, and possession; and gender-implicated imagery.

4 units (Vinograd) not given 1997-98

228. Graduate Seminar: Gender and Pictorial Narrative in China—Gendered roles and representations, romantic and erotic themes, and strategies of pictorial illustration and narrative in Chinese paintings and prints of the late Ming and Qing periods.

4 units (Vinograd) not given 1997-98

228A. Seminar: Pictorial Art and Cultural Spaces in Late Ming China—Studies of late 16th- through mid-17th century Chinese painting and printmaking in the context of emerging cultural and media spaces. Topics: narrative spaces and staging of drama and fiction; sites of urban entertainment, psychological spaces of subjectivity and desire, spaces of historical representation; and the proliferation of image spaces.

4 units, Aut (Vinograd)

229D. Graduate Seminar: Problematizing the Japanese Landscape of Travel—(Same as Religious Studies 204.) The cultural construction of landscape in medieval and premodern Japan. The representation of landscapes, seen and imagined, in painting, literature, religion, and social practice. Topics: religious visions and ritual fields (mandalas, sacred mountains), sites of cult and cult of sight (Fuji, Kumano), narratives of itinerary (travel diaries, illustrated hand scrolls), and topographic taxonomies (Meisho, Shinkkeizu, guidebooks).

4 units, Aut (Moerman, Takeuchi)

229E. Colloquium: “Pictures of the Floating World”—Images from Japanese Popular Culture—Paintings, woodblock prints, and printed books delineating urban life during the 17th-19th centuries. Questions of technique, representation, social identity, and censorship. Prerequisites: 2, 12, 129 or 129A.

4 units, Win (Takeuchi)

229F. Seminar: 18th-Century Japanese Painting—Investigation of the rise of new styles and artistic revivals, the extraordinary number of “eccentric” painters, influences from China and the West, the proliferation of art-historical treatises, and the redefinition of the role of the artist in Japanese society. Prerequisites: 2, 12, 129 or 129A.

4 units (Takeuchi) not given 1997-98

229G. Colloquium: Women and Gender in Japanese Art—For undergraduates and graduates. Women as patron, subject, and artist in Japanese society; conventions of homosexuality and hypersexuality; the pleasure quarters, theatricality, eroticism, censorship, the body, and the construction of play and fashion. Prerequisites: 2, 12, 129 or 129A, or consent of instructor.

4 units (Takeuchi) not given 1997-98


4 units (W. Corn) not given 1997-98

231N. Stanford Introductory Seminar: Hollywood and New York—The 1940s—Preference to freshmen. Examines works of major painters, photographers, and filmmakers of the 1940s: Edward Hopper, Jackson Pollock, Willem de Kooning and Weegee (painters and photographers), and John Ford, Preston Sturges, and Billy Wilder (film directors). Topics: war-time and Cold War propaganda, the popularization of psychoanalysis, period-specific constructions of the city, and other cultural and political practices and discourses. Examines paintings and films in terms of the internal histories of modernist painting and the American film industry.

4 units, Spr (Nemerov)

232A. Seminar: The Art of the Old West—Major painters and sculptors of the American West 1880-1920, including Frederic Remington, Charles
Mulvey, Deleuze. Screenings from narrative and Bazin, Christberg, Deren, Brakhage, Baudry, bring issues of performance into play. Theorists: Benjamin, Kracauer, Epstein, Vertov, Eisenstein, is open to debate. The mediums real-time aspects perceive, understand, and circulate through the world phantasmagoric diversion, cinemas role in how we immediate and palpable; as concrete perception or perception? As a medium insufficiently real or too industrial, modern life. What are the implications of emas relation to human perception in the context of revelatory Literature 2470 Film theory emphasizes cin-

326 SCHOOL OF HUMANITIES AND SCIENCES

Russell, and Charles Schreyvogel. Cowboys and Indians in the context of evolutionary theory, ethno-

graphic documentation, national symbolism, immi-

gration and the urban world, the advent of movies, other turn-of-the-century nostalgias (e.g., New En-

gland and the Middle Ages), and questions about the recoverability of the past.

4 units (Nemerov) not given 1997-98

232B. Colloquium: Contemporary Cultural Criticism—The ideological content of recent mov-

es, television shows and commercials, art exhibi-

tions, sporting events, and other contemporary prod-

ucts of American culture.

4 units (Nemerov) not given 1997-98

232E. Seminar: Interpretation and History—
The Art of Benjamin West—Study of Benjamin West (1738-1820), the American artist who spent most of his career in England as court painter to George III. The "new historical" emphasis on the West in terms of the various discourses (British colonial expansion) embodied in his art. Close readings of individual works by West and his contempo-

raries.

4 units (Nemerov) not given 1997-98

233. Colloquium on the History of Photogra-

phy—Readings on the history and criticism of photo-

graphy combined with a close study of works in Bay Area collections. Enrollment limited.

4 units (W. Corn) not given 1997-98

234Q. Stanford Introductory Seminar: Dialogue on the History of Photography

2 units, Spr (Leivick)

236. Art History Bibliography and Library Meth-

ods—Primarily for art history graduate students; upper-class undergraduate majors who plan to con-

tinue in art history on the graduate level may enroll with the consent of the instructor. Introduction to reference works and library techniques essential to the study of architectural and art history. Sources of artistic, historical, and cultural information in their printed and automated forms.

4 units, Aut (Ross)

247. Theories of the Moving Image I—Cinema and Models of Perception—(Same as Compara-

tive Literature 247.) Film theory emphasizes cin-

emas relation to human perception in the context of industrial, modern life. What are the implications of a medium similar to, but distinct from, human perception? As a medium insufficiently real or too immediate and palpable; as concrete perception or phantasmagoric diversion, cinemarole in how we perceive, understand, and circulate through the world is open to debate. The mediums real-time aspects bring issues of performance into play. Theorists: Benjamin, Kracauer, Epstein, Vertov, Eisenstein, Bazin, Christberg, Deren, Brakhage, Baudry, Mulvey, Deleuze. Screenings from narrative and non-narrative models. Enrollment limited to 20. Recommended: 140 or equivalent.

4 units, Win (Bukatman)

261. Undergraduate Seminar: Dutch Painting in Utrecht during the Golden Age—Combines semi-

nars with study trips to view masterworks in Masters of Light: Dutch Painters in Utrecht during the Golden Age, an international loan exhibition co-

organized by instructor. Idiosyncrasies of the Utrecht school are examined within the wider context of Dutch 17th-century art. The paintings of leading Dutch Caravaggesque artists from Utrecht: Ter Bruggghen, Honthorst and Baburen, and the influences on Rembrandt, Hals, and Vermeer. The socioeconomic, political, and religious conditions giving rise to the distinctive style of Utrecht painting. Field trips.

4 units, Aut (Orr)

262. Undergraduate Seminar: China Avant-

Garde—The Phoenix Arising—Recent trends in Chinese art created outside the bounds of official art organizations. Focuses on artists and works in-

cluded in the concurrent "China’s New Art, Post-1989" exhibition at the San Jose Museum of Art.

Field trip to the exhibition.

4 units, Aut (Erickson)

263. Psychoanalytic Perspectives on Art and Lit-

erature—Experiments with and critiques psycho-

analytic perspectives on a broad spectrum of visual images and literary texts. Book illustration, adver-

tising, and the cartoon strip; more conventional media such as theater, novel, painting, and sculpture.


4 units, Aut (Spitz)


4 units, Win (Kobayashi)

277. Seminar: Le Corbusier and Problems in Modern Architecture—A study of this controver-

sial figure in modern architecture and city planning, whose designs and writings shaped the contempo-

rary environment throughout the world. Students conduct research on a selected aspect of Le Corbusier's work, development, theory, influence, or connection with related subjects. Prerequisites: 175, consent of instructor.

4 units (Turner) not given 1997-98

278. Seminar: The American College Campus—
The college or university campus is a distinctively American type of environmental planning. The his-

torical development of the American campus, its spaces, and architecture. Focuses on issues relating to the Stanford and other Bay Area campuses.

Prerequisites: 176, consent of instructor.

4 units (Turner)
278N. Stanford Introductory Seminar: The Stanford Campus, Architectural History in Microcosm—Preference to freshmen. The buildings and grounds of Stanford provide examples of architectural traditions and developments of the 19th and 20th centuries. The campus is used as a laboratory for the examination of these subjects and of basic architectural concepts and principles.

4 units, Aut (Turner)

279. Seminar: Frank Lloyd Wright and Problems in American Architecture—The career and work of this American architect, whose innovations and designs affected domestic and suburban architecture. Students choose a subject of individual research, dealing with a specific design or aspect of Wright’s work. Field trips to Wright’s buildings in the Bay Area. Prerequisites: 175 or 176, consent of instructor.

4 units (Turner) not given 1997-98

280. Seminar: Utopia and Reality in Modern Urban Planning—Primarily for Urban Studies majors, but others may be admitted. Utopian urbanist thinkers (Ebenezer Howard, Le Corbusier, Frank Lloyd Wright, etc.) who established the conceptual groundwork of contemporary urban planning practice. Student participation and research-oriented term paper required. (WIM)

4 units, Win, Spr (Stout, Turner)

298. Individual Work: Art History

any quarter (Staff)

299. Research Project: Art History

any quarter (Staff)

300. Graduate Proseminar: Graduate Studies in Art History—For first-year art history graduate students only. Introduction to fields, issues, and practices in art history.

2 units, Aut (Nemerov)

322. Graduate Seminar: Crossroads of the Enlightenment—The Artistic Culture of Rome in the mid-18th Century—Rome, as a long-privileged site for training young artists, acquired new importance following the discovery of ruins at Herculaneum and Pompeii (1730-1780). Roman artistic culture, as the arena where international artists and critics, dealers, and dilettantes met and were visited by wealthy young people making the Grand Tour, became the center of the contemporary art in Europe. Students research topics and presentations on any relevant aspect of artistic life in Rome at this time: patronage and patterns of collecting, monographs on artists or writers working in the city, art practices characteristic to Rome (e.g., copying antiquities), or constructions of the “mythic” Rome in visual renderings or written accounts. Prerequisite: working knowledge of at least one non-English language.

4 units (Marrinan) not given 1997-98

324. Graduate Seminar: Theories of the Sublime and Art—For graduate students and advanced art history majors only. The notion of the sublime through the terms of art and art history. Readings in philosophy and literary criticism (Kant, Burke, De Man, Lacoue-Labarthe, Lyotard, Nancy, Weiskel, etc.) and art historical “case studies” (European Romanticism, American landscape, modernist abstraction, earth work, and recent video).

4 units, Win (Lee)

331D. Graduate Seminar: The Visual and Literary Art of Edwardian England—Interdisciplinary study focusing on England 1895-1918. The works of major painters (John Singer Sargent); writings of Thomas Hardy, Henry James, Arthur Conan Doyle, Kenneth Grahame, and Beatrix Potter; the relation to contemporaneous American art and literature; and the English visual art and poetry of WWI and later 20th-century constructions of the Edwardian period.

4 units, Win (Nemerov)


4 units (Nemerov) not given 1997-98

335. Graduate Seminar: Visual Theory in Art History—Introduction to the major theoretical approaches in the contemporary praxis of art history through discussion and analysis of selected readings.

4 units (Lewis) not given 1997-98

335A. Seminar on Art History: Ideas and Ideology—Readings/discussion of contemporary art history and art criticism, dealing with the problematic of poststructuralism, feminism and issues of gender, the new Marxism, reception theory, semiotics, and deconstruction.

4 units (Lewis) not given 1997-98

335B. Graduate Seminar: Notions of “The Public” in Art Historical Discourse

4 units (Marrinan) not given 1997-98

335C. Graduate Seminar: The Vision of Art History

4 units (Marrinan) not given 1997-98

335D. Graduate Seminar: Narrative Theory and Visual Forms

4 units (Marrinan) not given 1997-98

335E. Graduate Seminar: Deconstruction and the Visual Arts—The work of Derrida, De Man, Barbara Johnson, etc., in relation to the visual arts.

4 units (Nemerov) not given 1997-98
335F. Graduate Seminar: French New Wave Film (1958-68)—Theory and Practice—Exploration of a radical paradigmatic shift in cinematic modernism in the works of Godard, Resnais, Truffaut, Varda, etc. New visual narratives of existentialist freedom, eroticism, and reflexivity.

4 units (Lewis) not given 1997-98

335G. Graduate Seminar: Beyond the New Wave—French Film in 1970s, 80s, and 90s—Postmodernism, narrative/anti-narrative, spectatorship and voyeurism, auteurism and cinematic reflexivity, America as problematic intertext, social and sexual politics, crises in gendered identity, and the "New History," centered on the later works of Godard, Chabrol, Renoir, Tanner, Truffaut, and Varda, and younger filmmakers (Beineix, Blier, Corneau, Kieslowski, Leconte, Pialat, Tavernier, Techiné, and Veber).

4 units, Win (Lewis)

335H. Seminar: Theories of Architecture—Open to undergraduate and graduate students. The tradition of theory in Western architecture, as in selected writings from Antiquity to the present. Various kinds of theory, their cultural contexts, and their roles in the practice of architecture. Architects and theorists: Vitruvius, Alberti, Perrault, Ruskin, Viollet-le-duc, Frank Lloyd Wright, Le Corbusier, Venturi. Limited enrollment. Prerequisite: some previous study of architectural history.

4 units (Berdini, Turner) not given 1997-98

351. Graduate Seminar: The Artist in his Museum: Copley, Peale, and Thomas Jefferson—Issues of American art 1775-1825, focusing on John Singleton Copley in his shift from late-colonial New England to Rome and England, and how he marketed his work to each of these audiences; Charles Willson Peale as artist and orchestrator of the first important American museum space; and Thomas Jefferson as theorist, patron, and designer of Monticello as a site for art.

4 units, Win (Stein)

395. Teaching Praxis

4 units, Aut, Win, Spr (Staff)

400. Dissertation: Art History

any quarter (Staff)

PRACTICE OF ART FOR NONMAJORS

These courses are designed for non-majors in studio art and have no prerequisites.

14. Drawing for Nonmajors

2 units, Aut (Godinez)

Win (Hinton)

16. Sculpture for Nonmajors

2 units, Win (Tuttle)

Spr (Carroll)

17. Photography for Nonmajors

2 units, Spr (Francisco)

BASIC

40. Basic Drawing—Basic concepts of drawing.

3 units, Aut, Win, Spr (Staff)

50. Clay Modeling—The human head and figure. Class projects are concerned with modeling from life using historical and modern sources.

3 units, Aut, Win, Spr (Randell)

53. Constructed Art—Simple assembly techniques, welding, and metal fabrication are used to construct non-representational sculpture using wood, metal, plastic.

3 units, Aut (Randell)

60. Basic Design—Introduction to visual language and media, and their applications to communication and environment. Two- and three-dimensional projects.

3 units, Aut (Kahn)

64. Color—Comprehensive study in the theories and practice of color. Emphasis is on working with color in a variety of media. Prerequisite: 60.

3 units, not given 1997-98

70. Photography I—The critical, theoretical, and practical aspects of creative photography are addressed through basic camera and lab techniques. Lecture/discussion, viewing of slides, and field work. Stanford Museum and Art Gallery viewing are scheduled according to current exhibitions. 35mm camera required.

4 units, Aut, Win, Spr (Leivick, Staff)

INTERMEDIATE

When available, students are encouraged to take intermediate and advanced design courses for 4-6 units.


4 units, Spr (Katz)

140. Drawing I—Recommended as the beginning drawing class for studio art majors. Fundamentals of composition in black and white. Emphasis is on the visual aspects of specific subjects which include still-life, model, landscape.

3 units, Aut, Win, Spr (Staff)

141. Drawing II—Intermediate/advanced drawing and composition. May be repeated for credit. Pre-
**ART 329**

**requisite:** 40 or 140, or consent of instructor.

**3 units, Aut, Win, Spr (Staff)**

**142. Drawing III**—Advanced drawing. Emphasis is on student initiative with respect to composition, color, and use of a variety of drawing materials. Work from imagination, still life, and model. May be repeated for credit. Prerequisite: 40 or 140, or consent of instructor.

**3 or more units, Aut, Win, Spr (Staff)**

**145. Painting I**—Introduction to painting procedure. Still-life, landscape, and figure studies in oil paint, emphasizing painting directly from life. May be repeated for credit.

**3 units, Aut, Win, Spr (Staff)**

**146. Painting II**—Intermediate painting. Extended problems in pictorial organization and content, with stress on oil painting. May be repeated for credit.

**Prerequisites: 40 or 140, 145, or consent of instructor.

3 units, Aut, Win, Spr (Staff)**

**147. Painting III**—Advanced painting with emphasis on the individual point of view. Prerequisites: three quarters of 145, 146, or equivalent, or consent of instructor.

**3 or more units, Aut, Win, Spr (Staff)**

**148A. Introduction to Printmaking**

**3 units (Chagoya)**

**148. Monotype**—Introduction to print-making using monotype, a graphic art medium used by such artists as Blake, Degas, Gauguin, Pendergast, etc. May be repeated for credit.

**Prerequisite: 40 or 140.

3 units (Chagoya)**

**149. Collage**—The aesthetic and generative principles of this 20th-century art form. Projects utilize a variety of media and materials. Examples of collage in music and literature supplement the emphasis on visual form.

**Prerequisites: 40 or 140, 145 or consent of instructor.

3 units, Spr (Hannah)**

**153. Recent Sculpture Concepts and Projects**—Study and practice of the art of recent decades, emphasizing current postabstract procedures. Various materials and nonmaterials. Prerequisite: any one of 40, 50 or 53, 60 or 70.

**3 units, Win, Spr (Randell)**

**160. Intermediate Design**—Comprehensive design assignments in diverse media, emphasizing the relationship between professional design problems and their underlying elements and procedures. Prerequisite: 60.

**3 or more units, Win (Kahn)**

**161. Visual Icons and Symbols**—Introduction to the principles of type and symbol design, emphasizing conceptual thinking. Prerequisite: 60.

**3 or more units (Staff) not given 1997-98**

**166. Pattern Design**—Design projects in pattern as applied to cloth, paper, and other surface materials. Introduction to silkscreen printing process. Prerequisite: 160 or 161.

**3 or more units (Staff) not given 1997-98**

**168A. Introduction to Urban Design**—(Enroll in Urban Studies 170.)

**5 units, Win (Gast)**

**169. Professional Design Exploration**—Six to eight mature projects stimulated by weekly field trips into significant areas of design activity or need.

**3 or more units (Kahn) not given 1997-98**

**170. Photography II**—Students individually pursue a topic of their own definition. Class sessions meet for individual and group critiques, lab demonstration, discussions, and slide lectures.

**3 units, Win, Spr (Staff)**

**172. Alternative Processes**—Priority to advanced students. Technical procedures and the uses of primitive and hand-made photographic emulsions. Enrollment limited to 10. Prerequisites: 70, 170, 270, or consent of instructor.

**3 units, Aut (Leivick)**

**173. Photography Abroad**—Students register for 1 or more units for work done out of residence or in an overseas program. Lab work on return to Stanford campus. Prerequisite: consent of instructor.

**1 or more units, Aut, Win, Spr (Leivick, Staff)**

**173A. Photography: Pinhole to Pixel**—Students construct their own cameras from ordinary light-tight objects (shoe boxes, cookie tins, match boxes, waste baskets). Paper negatives from these cameras can be printed using conventional darkroom techniques or by scanning, modifying, and enhancing them on a computer using Photoshop. Themes of invention, discovery, creativity, craft, and technology are discussed during critiques.

**3 units (Staff)**

**174. Digital Art in Public Areas**—The relationship between digital art, public policy, and community action. Large-scale works are produced for installation in Bay Area public spaces using digital art media. Final project is a collaborative effort between student artists, community administrators, and the public involving issues of public concern, communication strategies, fundraising, and interacting with the press. For pre-enrollment, see http://www-leland.stanford.edu/dept/SUDAC. Prerequisites: 70, 145 or 60, plus working knowledge of Photoshop and Illustrator.

**3 units, Win (Lam-Niemeyer)**

**ADVANCED UNDERGRADUATE AND GRADUATE**

When available, students are encouraged to take intermediate and advanced design courses for 4-6 units.
200. The Work of Art and the Creation of Mind—
(Enroll in Education 200.)
3 units, Win (Chagoya, Eisner, Hannah, Rehm, Ross, Sano)

241. Advanced Drawing and Painting Criticism I—Prerequisites: at least two quarters of painting or drawing and consent of instructor.
Aut, Win, Spr (Staff)

242. Advanced Drawing and Painting Criticism II—Prerequisites: at least two quarters of painting or drawing and consent of instructor.
Aut, Win, Spr (Hannah)

243. Advanced Drawing and Painting Criticism III—Prerequisites: at least two quarters of painting or drawing and consent of instructor
Aut, Win, Spr (Staff)

244. Advanced Drawing and Painting Criticism IV—Prerequisites: at least two quarters of painting or drawing and consent of instructor.
Aut, Win, Spr (Branch)

246. Individual Work: Drawing and Painting—Prerequisites: at least two quarters of painting or drawing and consent of instructor.
Aut, Win, Spr (Staff)

248. Advanced Monotype—Continuation of monotype, dealing with advanced technical and aesthetic problems in the medium. Prerequisite: 148.
3 or more units (Chagoya)

250. Individual Work: Sculpture any quarter (Randell)

260. Individual Work: Design any quarter (Kahn)

261. Visual Communication—Design experiences in a wide range of media for communication utilizing a combination of typographic material and images. Class projects focus on producing a cohesive visual program of identity system. Prerequisites: any two design courses above 160.
3 or more units (Staff) not given 1997-98

262. Visual Essay—Design experiences in visual communication through analytical approaches of visual problem solving. Class projects developed as book or similar sequential formats.
3 or more units (Staff) not given 1997-98

268. Design Synthesis—Mature semi-elective problems in composite and multi-media design areas. Prerequisites: any two design courses above 160.
4 or more units, Spr (Kahn)

269. Advanced Creative Studies—Seminar based on elective design projects in areas of individual specialization. Prerequisite: consent of instructor.
3 or more units, Aut (Kahn)

270. Photography III—Student continues with own work, showing it in weekly seminar critiques.
Aut, Win, Spr (Leivick Staff)

271. The View Camera, its Uses and Techniques—Designed for serious students of photography who wish to gain greater control and refine skills in image-making. 4 x 5 view cameras are provided. Enrollment limited to 8.
3 units, Aut, Win, Spr (Leivick, Staff)

272. Individual Work: Photography—Student continues with own work, showing it in weekly seminar critiques.
any quarter (Leivick Staff)

281. Concepts of Text for Human-Computer Interfaces—Fundamentals of typographic design for computer-user interfaces. Topics: font aesthetics and technology; perception, reading, and legibility; form, pattern, and texture in the typographic image; text organization; integration of text and image; semiology and semiotics of writing systems.
3 units, Spr (Bigelow)

310A,B,C. Directed Reading: Studio
3 units, any quarter (Staff)

342. Master's Project any quarter (Staff)

360A,B,C. Master's Project (Seminar): Design
Aut, Win Spr (Kahn)

RELATED TOPICS
Visual Thinking—(See Mechanical Engineering 101.)

Human Values in Design—(See Mechanical Engineering 115A.)

OVERSEAS STUDIES
The following courses are approved for the Art major and taught overseas at the campus indicated below. Students should discuss with their major advisers on campus which courses would best meet their educational needs. Course descriptions can be found in the “Overseas Section” section of this bulletin or in the Overseas Studies Program office, 126 Sweet Hall.

BERLIN
173Y. Industrial Revolution and its Impact on Art, Architecture, and Theory—(Same as Overseas Studies 117V.)
5 units, Aut (Neckenig)

174Y. Architecture and the City, 1871-1990: Berlin as Nucleus of Modernity—(Same as Overseas Studies 143U.)
4 units, Win (Neckenig)

177Y. Architecture and Culture of Modern Berlin
4 units, Spr (Berdini)

282Y. The Bauhaus
units by arrangement, Spr (Berdini)
FLORENCE
111Y. From Giotto to Michelangelo: Introduction to the Renaissance in Florence
4 units, Win (Verdon)

112Y. The Duomo and Palazzo della Signora: Symbols of a Civilization
4 units, Aut (Verdon)

OXFORD
174X. Contemporary Architecture in Britain and Europe
4 units, Win (Stevenson)

221Y. Art and Society in Britain
5 units, Aut (Tyack)

PARIS
120Y. Post-Naturalist Painting
4 units, Win (Marrinan)

221Y. Constructions of the Masterpiece in 19th-Century France
4 units, Aut (Marrinan)

222Y. Paris as Artifact: Designing Paris
4 units, Aut (Marrinan)

222Z. Paris as Artifact II: Decorating Paris
4 units, Win (Marrinan)

ASIAN LANGUAGES
Emeriti: (Professors) Albert E. Dien, David S. Nivison, Makoto Ueda
Chair: Haun Saussy
Professor: John C. Y. Wang
Associate Professors: Thomas W. Hare (Asian Languages and Comparative Literature, on leave 1997-1998), William A. Lyell, Susan K. Matisoff, Haun Saussy (Asian Languages and Comparative Literature)
Assistant Professors: Wan Liu (on leave 1997-98), Yoshiko Matsumoto, James Reichert, Chaofen Sun
Courtesy Associate Professor: Melinda Takeuchi (Art)
Senior Lecturers: Kazuko M. Busbin, Yin Chuang, Kimie Nishimura Nebrig, Dorothy Shou
Lecturers: Hill Gates (Anthropology), Deborah Rudolph

The Department of Asian Languages offers courses in the languages, linguistics, cultures, and literatures of China, Japan, and Korea. The department accepts candidates for the degrees of Bachelor of Arts, Master of Arts, and Doctor of Philosophy in Chinese or Japanese. It also offers a Ph.D. minor in Chinese or Japanese language and literature.

For information concerning other opportunities for study in the Asian field, see listings under the following departments and programs: Anthropology, Art, Business, Comparative Literature, East Asian Studies, Economics, Humanities Special Programs, History, Law, Linguistics, Philosophy, Political Science, Religious Studies, and Sociology. Students interested in Asian languages not listed should contact the Special Language Program, Language Center.

UNDERGRADUATE PROGRAMS
BACHELOR OF ARTS

The A.B. degree is granted both in Chinese and in Japanese. The following courses and their prerequisites must be completed with a grade point average (GPA) of "C" or better:

1. Concentrations in Chinese: Asian Languages 91 and 92, Chinese 207, Asian Languages 131, 132, 133, and four other content courses dealing with China primarily at the 100 level, as approved by the undergraduate adviser. Asian Languages 133 is the required Writing in the Major (WIM) course.

2. Concentrations in Japanese: Asian Languages 91 and 92, Japanese 103, and seven other content courses dealing primarily with Japan at the 100 level, as approved by the undergraduate adviser. At least two of these courses must be
selected from the sequence 135, 136, 137, 138. Asian Languages 138 is the required WIM course. Asian Languages 51/151 and Japanese 30/130 are not counted toward the major.

These requirements are in addition to the University's basic requirement for the bachelor's degree. Letter grades are mandatory for all required courses.

**MINORS**

The undergraduate minor in Asian Languages has been designed to give students majoring in other departments an opportunity to gain a substantial introduction to Chinese (Mandarin) or Japanese language, as well as an introduction to the culture and civilization of East Asia. The minor consists of:

1. Completion of one year of language study at the second-year level (that is, Chinese 21, 22, 23 or Japanese 21, 22, 23) for students with no previous training in Chinese or Japanese. Students who already have first-year competence in Chinese or Japanese before undertaking any training in the Department of Asian Languages, must complete the third-year course (Chinese 101, 102, 103 or Japanese 101, 102, 103). Students who already have a competence at the second-year level may fulfill the language component of the minor by taking three courses in the department using materials in either Chinese or Japanese. These courses may be language courses such as the third-year sequence mentioned above, or they may be advanced literature and linguistics courses, depending on the capabilities and interests of the student in question.

2. The core courses, Asian Languages 91 (Traditional East Asian Civilization: China), and Asian Languages 92 (Traditional East Asian Civilization: Japan).

3. Two courses selected from among the department's other offerings in literature, linguistics, and civilization. All courses for the minor must be completed with an GPA of 'C' or better.

**HONORS PROGRAM**

Majors with an overall GPA of 3.5 may apply for the honors program by submitting a senior thesis proposal to the honors committee during Winter or Spring Quarter of the junior year. The proposal must include a thesis outline, a list of all relevant courses the student has taken or plans to take, a skeleton reading list including a work or works in Chinese or Japanese, and the name of a faculty member who has agreed to act as honors supervisor.

If the proposal is approved, research and writing begins in the Spring Quarter of the junior year, and for the first two quarters takes the form of directed reading with the chosen supervisor; the finished essay (normally about 15,000 words) is submitted to the committee no later than the end of the Winter Quarter in the senior year. From 10 to 15 units of credit are granted for the finished thesis.

**COTERMINAL PROGRAMS**

With department approval, students may be able to combine programs for the A.B. and A.M. degrees in Chinese or Japanese. For details, see the "Graduate Degrees" section of this bulletin.

**EAST ASIAN STUDIES THEME HOUSE**

EAST House, located at Governor's Corner on campus, is an undergraduate residence that houses 60 students and offers them a wide variety of opportunities to expand their knowledge, understanding, and appreciation of East Asia. Assignment is made through the regular undergraduate housing draw.

**SUMMER PROGRAM**

A nine-week summer program of intensive instruction is offered, on three different levels, in both Chinese and Japanese. The intensive courses provide the equivalent in instruction to regular academic-year courses. For detailed information about these and other aspects of the summer program, inquire at the Department of Asian Languages.

**GRADUATE PROGRAMS ADMISSION**

All students contemplating application for admission to graduate study must have a creditable undergraduate record. The applicant need not have majored in Chinese or Japanese as an undergraduate, but must have had the equivalent of at least three years of training in the language in which he or she intends to specialize, and must also demonstrate a command of English adequate for the pursuit of graduate study. Applicants should not wish merely to acquire or improve language skills, but to pursue study in one of the following fields: Chinese history (premodern), Chinese linguistics, Chinese literature, Chinese philosophy, Japanese cultural history, Japanese literature, and Japanese linguistics.

**MASTER OF ARTS**

The A.M. is granted in Chinese and in Japanese. The normal length of study for the degree is two years.

Applicants who wish to obtain only the A.M. and who do not intend to proceed to the Ph.D. are considered only if no financial aid is requested. Students who wish to spend the first year of graduate study at the Taipei or Yokohama centers must obtain department approval first.
Candidates for the degree must be in residence at Stanford in California during the final quarter of registration.

A thesis or an annotated translation of a text of suitable literary or historical worth is required for the A.M. degree. Under special circumstances, a paper approved by the graduate adviser may be substituted.

The University's basic requirements for the master's degree, including a 36-unit minimum requirement, are given in the "Graduate Degrees" section of this bulletin. Department requirements are set forth below.

**CHINESE**

The candidate must:

1. Meet the department's requirements for the A.B. in Chinese or their equivalent.
2. Complete the following course work: 103, 201, 221, 222, 223, 299; four courses in Chinese numbered between 230 and 292; and two upper-division or graduate-level courses in fields such as Chinese anthropology, art, history, philosophy, and politics as approved by the graduate adviser in consultation with the student's individual adviser. Students may be exempted from 101, 102, 103, and 221, 222, 223 by passing examinations to demonstrate that they have attained equivalent language competence. Letter grades are mandatory for all required courses and their prerequisites.

**JAPANESE**

The candidate must:

1. Meet the department's requirements for the A.B. in Japanese or their equivalent.
2. Complete the following course work: 201, 211-213, 246, 247, 248, 299; four courses in Japanese numbered between 256 and 298; one course in literary theory or methodology at the 100 level or higher; and two courses in such fields as Japanese anthropology, art, history, politics, and religion, as approved by the graduate adviser in consultation with the student's individual adviser. Students may be exempted from 211, 212, 213, and 246 by passing examinations to demonstrate that they have attained equivalent language competence. Letter grades are mandatory for all required courses and their prerequisites.

**DOCTOR OF PHILOSOPHY**

The Ph.D. degree is granted in Chinese and Japanese. Candidates for the degree are expected to acquire a thorough familiarity with Chinese or Japanese literature, an adequate command of both languages, and a comprehensive knowledge of East Asian history, social institutions, and thought. The University's basic requirements for the Ph.D. are given in the "Graduate Degrees" section of this bulletin. Department requirements are set forth below.

**ADMISSION TO CANDIDACY**

Students admitted with an A.B. only are evaluated by the graduate faculty during the Autumn Quarter of their second year at Stanford. The evaluation is based on written work and at least a portion of the A.M. thesis or translation. If the faculty has serious doubts about a student's ability to work for the Ph.D., they will convey this to the student. During the subsequent Spring Quarter, the faculty formally decides whether a student should be admitted to candidacy for the Ph.D. or be terminated. In the case of a student who already has an A.M. in Chinese or Japanese when admitted to the department, the evaluation takes place in the Spring Quarter of the student's first year. If a student goes to the Taipei or Yokohama centers during his or her first two years, the department will consider an extension for admission to candidacy. The timing of the evaluation of a student admitted with an A.M. in East Asian Studies is decided on an individual basis.

Admission to candidacy does not mean that the student has fulfilled all requirements for the degree except the dissertation, but that the department faculty consider the student qualified to pursue a program of study leading to the Ph.D. and that, subject to continued satisfactory progress, the student's status in this department is secure.

**REQUIREMENTS**

A candidate must fulfill the following requirements:

1. Demonstrate a reading knowledge of French, German, or another European language approved by the graduate adviser.
2. Complete two seminars at the 300 level. These seminars must be in different subjects.
3. Pass an examination in the supporting Asian language. A candidate whose field is Chinese is examined on his or her ability to read modern Japanese works relevant to his or her field of study. This requirement may be met by taking Japanese 101, 102, and 103 or 104 for letter grades. A candidate whose field is Japanese is examined on ability to read classical Chinese works relevant to his or her field of study. This requirement may be met either by taking Chinese 205, 206, and 207 for letter grades or by completing Japanese 250 and subsequently passing a test on the prescribed reading list in Kambun.
4. Pass a set of four comprehensive written examinations. One of these tests the candidate's methodological competence in a discipline. The remaining three fields are chosen, with the approval of the graduate adviser in consultation with the student's individual adviser, from the following: Chinese literature, history, phi-
losophy, linguistics, religion, art, and anthropology; Japanese literature, linguistics, history, religion, art, and anthropology.

5. Demonstrate pedagogical proficiency by serving as a teaching assistant for a minimum of one quarter, and taking Chinese, Japanese, or Korean 208 (Teaching Asian Languages).

University Oral Examination—General regulations governing the oral examination are found in the "Graduate Degrees" section of this bulletin. The candidate is examined on questions related to the dissertation, after acceptable parts of it have been completed in draft form.

Dissertation—The candidate must write a dissertation demonstrating ability to undertake original research based on primary materials in Chinese or Japanese.

Ph.D. MINOR

A student taking a minor in Asian Languages must complete at least 30 units of work within the department at the 200 and 300 level, chosen in consultation with a department adviser. The student must elect either Chinese or Japanese 201 unless the department is satisfied that work done elsewhere has provided similar training. The student must also pass a written examination in the Chinese or Japanese language.

STUDYING ABROAD

Students interested in a serious study of Japanese language, history, culture, and social organization are encouraged to apply to the Kyoto Center for Japanese Studies (KCJS), a September-to-April program managed by Stanford and including students from other American universities. Students with two years of Japanese may attend the full academic year, or Autumn or Spring semester only. In Spring Quarter, the Stanford Center for Technology and Innovation (SCTI), also in Kyoto, focuses on Japanese organizations and the political economy of research, development, and production of high technology and advanced industries, followed by a two-to-three month internship in an agency, firm, or laboratory in Japan. For students in a technical major, two quarters of Modern Japanese or five quarters of Japanese for Professionals fulfill the SCTI language requirement; for students in a non-technical major, five quarters of Modern Japanese fulfill the SCTI language requirement. For information about either program in Kyoto, students should contact the Overseas Studies office in Sweet Hall.

Students should take note of the programs of the Inter-University Board for Chinese Language Studies and the Inter-University Center for Japanese Studies located in Yokohama. Stanford is a member of these consortia programs. See "The Institute for International Studies" section in this bulletin.

Attention is also called to the exchange program established with the Department of Chinese at Peking University in Beijing. Those interested in the program should consult the chair of the department early in the academic year.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

Since unavoidable changes occasionally have to be made in course offerings after the Stanford Bulletin has gone to print, students are advised to consult the department each quarter.

GENERAL

These courses are open to all undergraduate and graduate students, are taught in English, and do not require a knowledge of an Asian language.

46. Introduction to Chinese Thought—(Enroll in Philosophy 46, Religious Studies 55.)
4 units (Ivanhoe) not given 1997-98

3 units, Win (Dasher)

55/155. Screening Modern China: Chinese Film and Culture—From film’s first appearance at a Shanghai variety show in August 1896 to John Woo’s latest transnational stardom, the history of cinema in China has been intertwined with issues of nationalism, imperialism, and cultural identity. How do Chinese films between the two fin-de-siecles create the spectacle of “China” at home and abroad? The cinemas of China, Taiwan, and Hong Kong: origins of early Chinese cinema, film’s relationship to literary and pop culture discourses (music, soap operas, fanzines), orientalist fantasies/translated sexualities (Gong Li as international icon), aesthetic responses to historical crises (Cultural Revolution, 1997 Hong Kong handover), “spectacular” violence and the martial-arts genre. Evening screenings.
4 units, Spr (Chow)

60N. Stanford Introductory Seminar: Poetry and Literacy—(Enroll in Comparative Literature 60.)
3 units, Aut (Saussy)

71N. Stanford Introductory Seminar: Language and Gender in Japan—Myths and Reality—Preference to freshmen. The social position in women in Japan is believed to be reflected in a characteristically feminine form of the language. Past and present speech styles of women, linguistic ideology, class, generation differences, and identity in Japan. How belief and reality are refracted through mass media and fictional representations. Compar-
jsions with male speech styles and with similar phenomena in other cultures. GER:3b (DR:9)
3 units, Win (Matsumoto)

1 unit, Win (Y. Wang)

91. Traditional East Asian Civilization: China—Introduction to Chinese culture in a historical context. GER:3a,4a (DR:2 or 7)
5 units, Aut (Rudolph)

92. Traditional East Asian Civilization: Japan—Perspectives on Japan's traditional civilization by faculty from Art, Asian Languages, History, and Religious Studies. Students learn the intellectual methods of various disciplines in a common examination of traditional Japan, based on literary works, historical documents, religious texts, and art objects. Three lectures, one section. GER:3a,4a (DR:2 or 7)
5 units, Win (Matsumoto)

95. The Japanese Language in Culture and Society—Introduction to the essentials of how the language functions in Japanese society and culture; salient characteristics are contrasted with English. Topics: politeness rules, conversational strategies, language and gender, formulaic expressions and factors that make certain linguistic forms preferred in Japanese. Recommended: one quarter of Japanese 1 or equivalent. GER:3a (DR:7)
4 units (Matsumoto) not given 1997-98

5 units (Ivanhoe) not given 1997-98

114. Haiku—Japanese haiku from the 16th century to the present. Works of Bashô, Buson, Issa, and other representative poets in English translation. Students exchange their readings of individual poems in class, learning how others have filled in the blanks in the text. Aspects of traditional Japanese aesthetics.
3 units (Ueda) not given 1997-98

120. The Boudoir and the Frontier—Classical poetry in translation, first millennium B.C. to the 9th century. Focuses on early songs and ballads which present romanticized folk archetypes (the soldier on the border, the abandoned wife, the courtesan, etc.) and later poetry influenced by this tradition. Readings: the Book of Songs, yûh-fu (Music Bureau) poetry from Han to 'T'ang, and shih poems by major poets. Selected historical and social-historical sources provide counterpoint. Prerequisite: 91.
4 units, Win (Egan)

131. Chinese Poetry in Translation—The Chinese poetic tradition from the first millennium B.C. to the 14th century. Traditional verse forms representative of the classical tradition; highlights of the most distinguished poets. Topics on history, language, and culture relevant to the literary works under study. GER:3a,4a (DR:2 or 7)
4 units, Aut (Staff)

132. Chinese Fiction and Drama in Translation—Fiction and drama from early times to the 19th century, emphasizing literary and thematic discussions of major representative works available in English translation. GER:4a (DR:2)
4 units, Win (Wang)

133. Modern and Contemporary Chinese Literature in Translation—Required writing-intensive course for Chinese majors. Readings in representative 20th-century works of fiction, drama, and poetry. (WIM)
4 units, Spr (Lyell)

135. Japanese Drama in Translation—The development of drama from early religious ritual forms through noh, puppet theater, and kabuki. Plays are analyzed as dramatic literature and in terms of performance. Video tapes supplement lectures. GER:3a (DR:7)
4 units (Matsumo) not given 1997-98

137. Japanese Fiction in Translation—Introduction to major works of prose narrative from premodern Japan (7th through mid-19th centuries) read in English translation, and emphasizing the historical, intellectual, and cultural context in which they were written. Works vary each year; may be repeated for credit with instructor's consent.
4 units, Aut (Bolton)

138. Modern Japanese Literature in Translation—Required writing-intensive course for Japanese majors. Introduction to Japanese poetry, drama, and fiction since 1868. Authors: Tanizaki, Kawabata, Mishima, etc. GER:3a (DR:7) (WIM)
4 units, Spr (Reichert)

141. Chinese Mythology and Lyrical Imaginat—Introduction to Chinese mythology. The mythic narratives about Chinese ancestry, legendary dynasties, natural deities, and divine heroes in Chinese culture, and the dissemination of myths in poetry that reenact earlier mythopoeic impulses and/or invoke primal fears and desires in different historical contexts. Approach is eclectic, incorporating Chinese and Western perspectives and drawing on theories of sinologists and general mythologists. GER:3a (DR:7)
4 units (Liu) not given 1997-98

181. Japanese Women Writers—Works in translation by women novelists and poets from the Meiji period to the present. Focuses on women's response
to their marginal role in Japanese society and the
literary establishment.

4 units (Matisoff) not given 1997-98

187/287. Romance, Desire, and Sexuality in Modern
Japanese Literature—Constructions of romance, desire, and sexuality (sexual connoisseurship, love suicide, nanshoku, etc.) in Edo Japan and how these paradigms are reconfigured by modern writers. Readings: Saikaku, Chikamatsu, Ichiyo, Soseki, Tanizaki, Kawabata, Hayashi Fumiko, and Mishima. GER:3a (DR:7)

4 units, Spr (Reichert)

273. The Postmodern Pacific—(Enroll in Comparative Literature 273.)

5 units, Win (Palumbo-Liu)

372. Literary Theory and the Necessary Fiction of Asia—Examination of effective multiculturalism (fantasy, misunderstanding, exaggeration, projection, and mirror effects) in the theories about literature and culture. Investigates the enabling role of a hypothetical “other” culture, and integrates the lessons into our practice as students of Asia. Readings from Hegel, Nietzsche, Segalen, Pound, Husserl, Corbin, Heidegger, Foucault, Derrida, de Man, Geertz, Said, Kristeva, Clifford, etc.

5 units (Saussy) not given 1997-98

CHINESE

Students registering for the first time in a first-
or second-year course must take a placement test if they have had any training in Chinese before entering Stanford. Sign up for a section in the department office before the quarter begins.

1,2,3. First-Year Modern Chinese—Conversation, grammar, reading, elementary composition. Daily sections may be set at the beginning of the quarter to suit schedule requirements.

1. 5 units, Aut (Chuang, Shou, Zeng)
2. 5 units, Win (Chuang, Shou, Zeng)
3. 5 units, Spr (Chuang, Shou, Zeng)

1B,2B,3B. First-Year Modern Chinese for Bilingual Students—For students with elementary comprehension and speaking skills. Provides a basic knowledge of modern Chinese literature and culture. Improves conversation and grammar.

1B. 3 units, Aut (Rozelle, Staff)
2B. 3 units, Win (Rozelle, Staff)
3B. 3 units, Spr (Rozelle, Staff)

5. Intensive First-Year Modern Chinese—Equivalent to 1, 2, and 3 combined. Five weeks at Stanford and four weeks at Peking University.

8 units, Sum (Staff)

6,7,8. Beginning Conversational Chinese—Three-quarter sequence to equip students with basic language skills in Mandarin to function abroad.

2 units, Aut, Win, Spr (Staff)

10,11,12. Beginning Southern Min (Taiwanese) Conversation

2 units, Aut, Win, Spr (Staff)

15,16,17. Beginning Cantonese Conversation—Three-quarter sequence designed to equip students with the basic language skills needed in everyday life situations.

2 units, Aut, Win, Spr (Leung)

21,22,23. Second-Year Modern Chinese—Further study in grammar, reading, conversation, composition. Prerequisite: 3 or equivalent.

21. 5 units, Aut (Y. Wang, Staff)
22. 5 units, Win (Y. Wang, Staff)
23. 5 units, Spr (Y. Wang, Staff)

21B,22B,23B. Second-Year Modern Chinese for Bilingual Students—For students with advanced comprehension and speaking skills, but lacking equivalent knowledge of grammar, reading, and writing Chinese characters. Equivalent to 21, 22, 23.

21B. 3 units, Aut (Y. Wang)
22B. 3 units, Win (Y. Wang)
23B. 3 units, Spr (Y. Wang)

25. Intensive Second-Year Modern Chinese—Equivalent to 21, 22, 23 combined. Five weeks at Stanford and four weeks at Peking University. Prerequisite: 3 or equivalent.

8 units, Sum (Staff)

27,28,29. Intermediate Chinese Conversation—Prerequisite: 3 or consent of instructor.

27. 2 units, Aut (Shou)
28. 2 units, Win (Shou)
29. 2 units, Spr (Shou)

51. Chinese Calligraphy—Practice in writing Chinese characters with a brush and learning different scripts. Limited enrollment. May be repeated for credit. Prerequisite: 3 or equivalent.

1-2 units, Win, Spr (Chuang)

ADVANCED

101,102,103. Third-Year Modern Chinese—Designed to help students solidify and further their communicative ability in Chinese through contact with various written and spoken styles of modern Chinese. Reading and discussion of authentic writings on cultural topics; newspaper reports, radio, and TV broadcasts and films; online Chinese software and e-mail network to facilitate study. Prerequisite: 23 or equivalent.

5 units, Aut, Win, Spr (Yu)

101B,102B,103B. Third-Year Modern Chinese for Bilingual Students—For students with advanced listening and speaking abilities, but lacking equivalent knowledge in reading and writing. Equivalent of 101, 102, 103. (See 101, 102, 103.)

3 units, Aut, Win, Spr (Yu)
105. Intensive Modern Chinese—Equivalent to 101, 102, 103 combined. Five weeks at Stanford and four weeks at Peking University. Prerequisite: 23 or equivalent.

8 units, Sum (Staff)

121,122,123. Advanced Chinese Conversation—Prerequisite: 23 or equivalent.

121. 2 units, Aut (Chuang)
122. 2 units, Win (Chuang)
123. 2 units, Spr (Chuang)


131/251. 3-4 units, Aut (Yu)
132/252. 3-4 units, Win (Yu)
133/253. 3-4 units, Spr (Yu)

199. Individual Reading in Chinese—Asian Languages majors only. Prerequisite: 103 or consent of instructor.

4 units, Aut, Win, Spr (Staff)

GRADUATE

200. Directed Reading in Chinese—Prerequisite: 213 or 223, or consent of instructor.

units by arrangement, Aut, Win, Spr (Staff)

201. Proseminar—Research methods in Chinese studies. Prerequisite: 223 or equivalent.

5 units, Win (J. Wang)

125/205, 126/206, 127/207. Beginning Classical Chinese—For students who need to develop a reading knowledge of Classical Chinese and have completed at least two years of Modern Chinese, or its equivalent. Students who have no background in Classical Chinese and are taking 207 to satisfy Chinese major requirements must begin with 205. Introduces basic grammar and commonly used vocabulary of classical Chinese. Prerequisite: 23 or equivalent.

205. 5 units, Aut (Sun)
206. 5 units, Win (Sun)
207. 5 units, Spr (Sahleen)

208. Teaching Asian Languages—Lectures on teaching methods, class visitations, and in-class teaching exercises to prepare students for a career in teaching. May be repeated for credit. Prerequisite: consent of mentor teacher.

2 units, Win (Sun)

211,212,213. Advanced Modern Chinese—Appropriate for non-majors and individuals with language experience overseas. Year-long sequence designed to help students become functional speakers, readers, and writers of modern Chinese through articles and essays from newspapers, magazines, and scholarly journals. Frequent opportunities for oral presentations reflect the students’ interests and form the basis of papers. Prerequisite: minimum three years of Chinese language training.

211. 5 units, Aut (Chuang)
212. 5 units, Win (Chuang)
213. 5 units, Spr (Chuang)

214. Introduction to Modern Chinese Literature—Introduction to modern and contemporary Chinese literature (short stories, novels, plays, and poetry) through annotated texts. Students discuss materials in Chinese during class. Prerequisite: three years of modern Chinese.

5 units, Aut (Lyell)

215. Yüeh-fu Poetry—In depth examination of the expanding genre of folk and imitation folk poetry. Readings: anonymous Han yüeh-fu; scholar yüeh-fu of the late-Han through the high-T’ang; popular songs of the Southern Dynasties; and “new yüeh-fu” of the mid-T’ang. Reference to orality/literacy and balladry issues.

4 units, Spr (Egan)

221,222,223. Advanced Classical Chinese—Prerequisite: 207 or equivalent.

221. Philosophical Texts

5 units, Aut (Sahleen)

222. Historical Narration

5 units, Spr (Wang)

223. Literary Essays

5 units (Staff) not given 1997-98

230. Interpreting Confucian Texts—(Enroll in Philosophy 212, Religious Studies 212.)

5 units, Aut (Ivanhoe)

231. Neo-Confucianism—(Enroll in Philosophy 114, Religious Studies 119.)

4 units, Win (Ivanhoe)

232. Nivison and his Critics—(Enroll in Philosophy 211, Religious Studies 211.)

4 units (Ivanhoe) not given 1997-98

241,242,243. Modern Chinese Literature—The short story, essay, and novel introduced through original and annotated texts.

241. The Short Story

5 units (Lyell) not given 1997-98

242. Essay

5 units, Aut (Chuang)

243. The Novel

5 units, Win (Lyell)

244. Workshop in Translation—Students practice translating modern and contemporary Chinese works of literature into good English. Books and
articles on the theory and practice of translation required. Students translate identical works and criticize and improve each other's work. Tool books introduced and discussed.

5 units (Lyell) not given 1997-98

261. Sources of Chinese Poetry—Selections from the Book of Songs (c. 1000-500 B.C.) and the Songs of Ch'u (c. 400 B.C.), the two earliest anthologies of Chinese poetry.
4 units, Spr (Saussy)

262. Early Chinese Prose and Verse Genres—Readings from the 6th-century anthology Wen xuan, encompassing examples of the shi lyric, the fu rhapsody, critical essays, letters, deliberations, memorials, eulogies, etc. Focus is on the intrinsic interest of the texts and on the anthologists' reasons for singling them out as model compositions. Readings in classical Chinese. Prerequisite: 207 or consent of instructor.
4 units (Saussy) not given 1997-98

263. Lyric (shih) I—Selected readings in the early history of the lyric (shih), Han through Sui dynasties.
4 units (Saussy) not given 1997-98

264. Lyric (shih) II—In-depth examination of T'ang poetry focusing on major figures and forms.
4 units (Liu) not given 1997-98

266. Chinese T'zu Poetry (Song Lyrics)—From the earlier T'ang to the end of the Sung Dynasty, the selected readings of song lyrics (tz'u) highlight major poets from Northern and Southern Sung periods. Patterns of generic development are correlated to social changes in historical context.
4 units, Win (Staff)

271, 272. Traditional Chinese Fiction—Selected readings in short stories and novels from early times to Ch'ing. Prerequisite: 207 or consent of instructor.
4 units (Wang) not given 1997-98

273. Chinese Drama—Selected readings in dramatic works of the Yuan, Ming, and Ch'ing periods emphasizing literary, not theatrical qualities. Prerequisite: 207 or consent of instructor.
4 units, Spr (J. Wang)

274. Apparitions of Women in Traditional Chinese Fiction—Selections from Lienü zhuang (a Han Dynasty exemplar book), Sui Yangdi yanshi, Nu caizi shu, and Hong lou meng.
4 units (Saussy) not given 1997-98

191/291. The Structure of Modern Chinese—Introduction to the grammatical structure of Chinese, focusing on syntax and semantics. Designed to help students, who have had one year or more of modern Chinese, develop a sophisticated knowledge of Chinese grammar. Prerequisite: 3 or equivalent, or consent of instructor.
4 units (Sun) not given 1997-98

192/292. The History of Chinese—Historical changes of the Chinese language in the last 2,000 years, emphasizing syntactic and semantic changes, and grammaticalization. Students use a computer corpus to do research on the history of Chinese. Prerequisites: 206 or consent of instructor.
4 units, Spr (Sun)

299. Master's Thesis or Translation—A total of 5 units taken in one or more quarters.
Aut, Win, Spr (Staff)

334. Seminar in Modern Chinese Literature—May be repeated for credit. Prerequisite: 243 or consent of instructor.
5 units, Spr (Lyell)

361. Seminar on T'zu Poetry of the Tang and Song
5 units, not given 1997-98

371. Seminar in Chinese Literary Criticism—Readings/discussion of Chinese critical texts vis-a-vis relevant literary theories in the West. May be repeated for credit.
5 units (Saussy) not given 1997-98

1-12 units, Aut, Win, Spr, Sum (Staff)

400. Advanced Language Training—Open only to students in the Inter-University Board for Chinese language programs in Beijing or Taipei. For more information, contact the consortium office at U.C. Berkeley (510) 642-3873.
1-15 units per quarter (Staff)

JAPANESE

Students registering for the first time in a first- or second-year course must take a placement test if they have had any training in Japanese before entering Stanford. Sign up for section in instructor's office before quarter begins.

1, 2, 3. First-Year Modern Japanese—Provides students with a solid foundation in grammar, conversation, reading, and basic composition (150 Kanji characters introduced).
1. 5 units, Aut (Busbin, Staff)
2. 5 units, Win (Busbin, Staff)
3. 5 units, Spr (Busbin, Staff)

5. Intensive First-Year Modern Japanese—Equivalent to 1, 2, and 3 combined.
12 units, Sum (Staff)

7/107. 3 units, Aut (Staff)
8/108. 3 units, Win (Staff)
9/109. 3 units, Spr (Staff)

17/117, 18/118, 19/119. Second-Year Japanese for Professionals—Continuation of 7, 8, 9 to build functional language skills. Focuses on Japanese as a means of communication. Prerequisite: 9/109 or equivalent.
17/117. 3 units, Aut (Kubo)
18/118. 3 units, Win (Kubo)
19/119. 3 units, Spr (Kubo)

21,22,23. Second-Year Modern Japanese—Continuation of Japanese 3 (or 5); Students develop conversation and expression of ideas; master more advanced grammatical patterns, use 600 kanji; write simple compositions, and have an enhanced understanding of Japanese culture. At the completion of the sequence, students can read original source material. Prerequisite: 3 or equivalent.
21. 5 units, Aut (Nebrig, Staff)
22. 5 units, Win (Nebrig, Staff)
23. 5 units, Spr (Nebrig, Staff)

25. Intensive Second-Year Modern Japanese—Equivalent to 21, 22, and 23 combined. Prerequisite: 3 or equivalent.
12 units, Sum (Staff)

27,28,29. Intermediate Japanese Conversation—Development of oral proficiency (“survival level”) through practice of simple sentence patterns, use of audiotapes, and oral presentations. Targeted for the practical use of Japanese. Useful for those participating in the SCTI program. Prerequisite: 3 or consent of instructor.
27. 2 units, Aut (Kubo, Staff)
28. 2 units, Win (Kubo, Staff)
29. 2 units, Spr (Kubo, Staff)

30/130. Reading Technical Japanese—Prerequisite: two years of Japanese or equivalent.
1-3 units, Sum (Dasher)

ADVANCED

101,102,103. Third-Year Modern Japanese—Third-year Japanese students move beyond acquisition of fundamental grammatical forms to reading and discussion of more complex material. Emphasis is on accurate understanding of Japanese sentence structure in newspaper and journal articles; readings from other genres (fiction, poetry, and essays). Polite language (keigo) skills and additional written and spoken patterns are mastered. Videos of everyday Japanese spoken at normal speed develop listening skills. Sequence course. Prerequisite: 23 or equivalent.
101. 5 units, Aut (Arao)
102. 5 units, Win (Arao)
103. 5 units, Spr (Arao)

104. Japanese for Chinese Specialists—Focus is on the use of research materials in Japanese. Prerequisite: 102 or equivalent.
3-5 units, Spr (Staff)

105. Intensive Third-Year Modern Japanese—Equivalent to 101, 102, and 103 combined. Prerequisite: 23 or equivalent.
12 units, Sum (Staff)

111,112,113. Business Japanese—Conducted entirely in Japanese. Readings/discussions focus on business-related topics: cultural attitudes and approaches, work ethic, stock market, import-export trade. Introduction to business letters, job interviews, and resume writing. May be repeated for credit. Prerequisite: 23 or 25 or consent of instructor.
111. 3 units, Aut (Staff)
112. 3 units, Win (Staff)
113. 3 units, Spr (Staff)

114. Japanese for Business—Eight-week summer course designed to improve Japanese language skills as used in business circles in Japan. Focuses on cultural attitudes and approaches, the stock market, international trade, business letters, usage of honorific forms and expressions, telephone etiquette, etc. Entirely in Japanese. Prerequisite: 23 or equivalent.
3 units, Sum (Staff)

121,122,123. Advanced Japanese Conversation—Creates “paragraph persons” with three focal points: fine tuning of grammatical points, practice of explaining things in Japanese, more fluency in speech. Use of audio/visual tapes, oral presentations, and discussions. Prerequisite: 23, 29, or consent of instructor.
121. 2 units, Aut (Kubo, Staff)
122. 2 units, Win (Kubo, Staff)
123. 2 units, Spr (Kubo, Staff)

177/277. The Structure of Japanese—Useful background for graduate students teaching Japanese. Linguistic analysis of the major grammatical structures of Japanese, focusing on their salient characteristics and functions. Prerequisite: two years of Japanese. Recommended: previous course in linguistics.
4 units, Spr (Matsumoto)

199. Individual Reading in Japanese—Asian Languages majors only. Prerequisite: 103 and consent of instructor.
4 units, Aut, Win, Spr (Staff)

GRADUATE

200. Directed Reading in Japanese—Prerequisite: 213 or consent of instructor.
units by arrangement, Aut, Win, Spr (Staff)

201. Proseminar—Bibliography and research methods in Japanese studies. Prerequisite: 103 or equivalent.
5 units, Aut (Matisoff)
208. Teaching Asian Languages—Lectures on teaching methods, class visitations, and in-class teaching exercises to prepare students for a career in teaching. May be repeated for credit. Prerequisite: consent of mentor teacher.
   2 units, Win (Matsumoto)

211, 212, 213. Advanced Modern Japanese—Increase ability to understand the structure of Japanese, become familiar with writings in different genres and styles, utilize such knowledge in writing, and discuss and express verbally questions and opinions on a variety of topics. Original writings, including fiction, essays, newspaper, and journal articles. Recommended taken in sequence. Prerequisite: 103 or equivalent.
   211: 5 units, Aut (Matsumoto)
   212: 5 units, Win (Staff)
   213: 5 units, Spr (Staff)

246. Introduction to Classical Japanese—The basic principles of the classical literary language, concentrating on grammar and vocabulary. Prerequisite: 103 or equivalent.
   5 units, Aut (Oyler)

247, 248. Readings in Classical Japanese—Readings of texts in classical Japanese from Nara through the Tokugawa periods. Literary analysis, rhetoric, and poetics (Japanese and Western). Offered alternate years and can be taken independently. Prerequisite: 246.
   247: 5 units, Spr (Matisoff)
   248: 5 units (Hare) not given 1997-98

250. Intensive Reading in Modern Japanese—Taught from the perspective of a writer. Emphasis is on changes the Japanese language went through in the last 100 years. Reading materials: early Meiji to the years following WW II. Authors: Soseki, Ogai, Ichiyo, and Tanizaki, etc.
   4 units, Win (Mizumura)

   5 units, Spr (Bielefeldt)

   4 units (Hare) not given 1997-98

277. The Structure of Japanese—See 177.

280. Medieval Japanese Narrative—Reading discussion of selected works of the Muromachi through early Edo periods. Prerequisite: 247, 248, or equivalent.
   4 units (Staff) not given 1997-98

281. Japanese Pragmatics—Japanese language from the point of view of pragmatics; focus is on socio-cultural and discourse factors reflected in choice of linguistic forms and their theoretical implications. Prerequisites: one year of Japanese, one course in linguistics or two years of Japanese, or consent of instructor.
   4 units (Matsumoto) not given 1997-98

296. Readings in Modern Japanese Literature—Readings/discussion of works selected from contemporary authors. May be repeated for credit. Prerequisite: 213 or equivalent.
   4 units, Win (Reichert)

298. Translation Workshop—Discussion of problems involved in translating Japanese into English. Students produce an original translation of a literary or documentary work from their major field of interest.
   4 units (Ueda) not given 1997-98

299. Master's Thesis or Translation—A total of 5 units, taken in one or more quarters.
   Aut, Win, Spr (Staff)

330. Seminar in Heian Fiction—Advanced work in Heian fiction concentrating on Genji monogatari. Substantial reading in the original text, discussions of narrative voice, literary structure, the interaction of poetry and prose, and critical reception. Students complete a major paper. Prerequisite: 247 or 248.
   5 units (Hare) not given 1997-98

333. Seminar in Japanese Classical Drama—Advanced work in traditional dramatic forms, with an emphasis on less studied genres including late Noh, Kowakami, and early varieties of puppet theater. Techniques of oral composition and influence across genres. Paper. Prerequisite: 247 or 248 or consent of instructor.
   5 units (Matisoff) not given 1997-98

396. Seminar in Modern Japanese Literature—May be repeated for credit.
   5 units, Aut (Reichert)

   1-12 units, Aut, Win, Spr, Sum (Staff)

400. Advanced Language Training—Open only to students at the Yokohama Center. For more information, see the program description under the "Inter-University Center for Japanese Studies in Yokohama" section in this bulletin.
   1-15 units per quarter (Staff)

KOREAN

1, 2, 3. First-Year Modern Korean—Elementary spoken and written Korean, equipping students with basic sentence patterns using basic vocabulary. Speaking, reading, writing, and listening comprehension with spoken language emphasized. Students develop the ability to say greetings, tell time, carry on limited conversation in classrooms, stores, and ask directions.
   5 units, Aut, Win, Spr (Cho)
21,22,23. Second-Year Modern Korean—Intermediate spoken and written Korean, providing students with more complex sentences in advanced grammatical patterns, building on the grammatical structures taught and learned during first-year Korean. Students are expected to be competent in conversing on topics in daily life situations. Emphasis is on speaking, reading, writing, and listening comprehension. Students communicate at an intermediate level of topics in everyday life, read simple texts, and have a good knowledge of Korean culture.

3 units, Aut, Win, Spr (Cho)

101,102,103. Third-Year Modern Korean—Advanced spoken and written Korean. Develops communicative competence in reading, writing, speaking, and listening skills. Students build their vocabulary, heighten their reading ability, and strengthen aural/oral skills. Through weekly writing assignments, students learn about syntax, pragmatic ways of expression, and logical ways of thinking in Korean. Short story telling, free-group discussion, and acquaintance with Korean drama, movie, news, newspapers, and songs.

1-3 units, Aut, Win, Spr (Cho)

171. The Structure of Modern Korean—See 271.

200. Directed Reading in Korean—Develops advanced reading and writing skills in modern Korean for future academic work. One discussion weekly, focusing on Korean linguistics; literature, culture, and history; economy and politics; Korean multimedia (CD-ROM and software); newspapers, magazines; Sino-Korean characters; or Korean conversation. Prerequisite: 103 or consent of instructor.

units by arrangement, Aut, Win, Spr (Cho)

208. Teaching Asian Languages—Lectures on teaching methods, class visitations, and in-class teaching exercises. Prepares students for a career in teaching. May be repeated for credit. Prerequisite: consent of instructor.

2 units, Win (Staff)

271. The Structure of Korean—Modern Korean. Syntax, phonology and morphology, psycholinguistics, sociolinguistics, language use (pragmatics), and language acquisition. Prerequisite: Korean 3 or equivalent (or consent of instructor)

4 units (Cho) not given 1997-98

ASTRONOMY COURSE PROGRAM

Emeriti: (Professors) Ronald N. Bracewell, Von R. Eshleman, John R. Spreiter
Committee in Charge: (Director) Vahe Petrosian;
Roger W. Romani, Peter A. Sturrock, Robert V. Wagoner, Arthur B. C. Walker, Jr.
Associate Professor: Peter F. Michelson (Physics)
Assistant Professors: Roger W. Romani (Physics), Jeffrey Willick (Physics)
Professor (Research): Philip H. Scherrer

Although Stanford University does not have a degree program in Astronomy or Astrophysics, teaching and research in various branches of these disciplines is an ongoing activity in the departments of Applied Physics, Electrical Engineering, and Physics. For the convenience of students interested in the general areas of astronomy, astrophysics, and cosmology, a course program for undergraduate and graduate study is listed below.

The program is especially committed to providing introductory courses for the student who wishes to be informed about the fields of astronomy without the need for prerequisites beyond high school algebra and physics. Astronomy courses numbered below 100 are designed to serve this group of students.

Astronomy courses numbered 100-199 serve the student interested in an initial scientific study of astronomy.

The courses numbered 200 and above are for graduate students and advanced undergraduates, subject to prior approval by the course instructor.

UNDERGRADUATE PROGRAMS

The University does not offer a separate undergraduate major in astronomy. Students who intend to pursue graduate study in astronomy or space science are encouraged to major in physics, following the advanced sequence if possible, or in electrical engineering if the student has a strongly developed interest in radioscience. The course descriptions for these basic studies are listed under the appropriate department sections of this bulletin. Students desiring guidance in developing an astronomy-oriented course of study should contact the chair of the Astronomy Program Committee. The following courses are suitable for undergraduates and are recommended to students considering advanced study: 100, Introduction to Observational and Laboratory Astronomy; 106, Planetary Exploration; 160, Introduction to Stellar and Galactic Astrophysics; 161, Extragalactic Astrophysics and Cosmology. Students planning study in astronomy beyond the B.S. are urged to take 262, Introduction to Gravitation and Astrophysics, and consider an undergraduate thesis (Astronomy 169). The student observatory, located in the hills to the west of the campus and equipped with a 20-inch and other small reflecting telescopes, is used for instruction of the observation-oriented courses.
GRADUATE PROGRAMS

Graduate programs in astronomy and astrophysics and related topics are carried out in the departments of Applied Physics, Electrical Engineering, and Physics. Students should consult the course listings, degree requirements, and research programs of these departments for more detailed information. For graduate research opportunities, see the “Center for Space Science and Astrophysics” section of this bulletin, or contact the Stanford–Ames Institute for Space Research.

Stanford is a member of a consortium building the Hobby Eberly telescope, a 10-meter-class telescope to be located at McDonald Observatory in Texas. Construction of the telescope is nearly completed. There will be opportunities for graduate students doing research projects to use this telescope starting in late 1997.

The following courses are recommended for students planning to conduct research in astronomy and astrophysics: Applied Physics—312 (Basic Plasma Physics), 363 (Solar Physics); Physics—262 (Introduction to Gravitation and Astrophysics), 301 (Astrophysics Laboratory), 360 (Stellar Physics), 362 (High Energy Astrophysics), 364 (Gravitation), 365 (Extragalactic Astrophysics and Cosmology), 460 (Astrophysics Seminar).

Students interested in research programs in space physics involving spacecraft studies of the planets, their satellites, and their near-space environments should see the “Center for Space Science and Astrophysics” section of this bulletin.

COURSES

15. Topics in Modern Astronomy—15A and B are for students not majoring in the sciences and are taught in different quarters by different instructors, but are related in topic. Students should not take both 15A and B.

15A. The Nature of the Universe—Introduction to the structure, origin, and evolution of the universe. The objects which make up the universe: galaxies, stars, planets, etc. Enigmas of modern astronomy: dark matter, quasars, x-ray sources, black holes, and pulsars. Topics: the formation of the sun and planets; the formation and evolution of stars and the dynamics and evolution of our galaxy; the organization and dynamics of luminous and non-luminous matter in the universe; the creation, evolution, and ultimate fate of the universe; and the search for life beyond our solar system. Presentations are non-mathematical. GER:2a (DR:5)

3 units, Win (Linde)

15B. Cosmic Horizons—Possible topics: the physical laws that govern the universe; its evolution traced from the initial primeval fire-ball; the formation of galaxies, stars, and planets; and the development of life. Exotic astronomical objects, quasars, pulsars, and black holes. Some algebra used. GER:2a (DR:5)

3 units, Spr (Willlick)


GER:2a (DR:5)

3 units, Aut (Wagoner)

50. Astronomy Laboratory and Observational Astronomy—Theory and use of the optical telescope and the interpretation of basic observational data of planets, stars, and galactic systems. Individual observations with a 14-inch Cassegrain telescope are supplemented by lectures/discussion of basic observational techniques, astronomical catalogs and coordinate systems, and the relation of observations to astrophysical models. Limited enrollment. Lab. GER:2a (DR:5)

3 units, Aut, Sum (Walker)

100. Introduction to Observational and Laboratory Astronomy—Introduction to observational techniques in astronomy for physical science or engineering students. Emphasis is on measurement of fundamental astronomical parameters such as distance, temperature, mass, and composition of stars. One two-hour lecture and one night of observation using the 14-inch telescope at the Stanford Student Observatory. Limited enrollment. Prerequisites: one year of physics, prior or concurrent registration in 25, 65, or 70; and consent of instructor. GER:2a (DR:5)

3 units (Staff) given 1998-99

169A,B,C. Independent Study in Astrophysics and Honors Thesis—Detailed study of a selected problem in astrophysics with one or more faculty members. While not all projects require three quarters, the sequence below suggests the format most projects are expected to follow. Projects may commence in any quarter.

169A. Selection of the Problem—Selection of the problem to be studied and development of the theoretical apparatus or initial interpretation of the selected problem. Preparation of a detailed description of the problem and its background and a comprehensive discussion of the work planned in the subsequent two quarters.

1-9 units, Aut (Staff)
169B. Continuation of Project—Substantial completion of the required computations or data analysis for the research project selected.
1-9 units, Win (Staff)

169C. Completion of the Project—Completion of research and writing of a detailed paper presenting methods used and results.
1-9 units, Spr (Staff)

AFFILIATED DEPARTMENT OFFERINGS

APPLIED PHYSICS

312. Basic Plasma Physics
3 units (Staff) alternate years, given 1998-99

363. Solar and Solar-Terrestrial Physics
3 units (Sturrock)
alternate years, given 1998-99

ELECTRICAL ENGINEERING

106. Planetary Exploration
3 units, Spr (Fraser-Smith)

GEOPHYSICS

195. Terrestrial Planets
2-3 units (Sleep)

PHYSICS

18N. Stanford Introductory Seminar: Revolutions in Concepts of the Cosmos
4 units, Spr (Walker)

160. Introduction to Stellar and Galactic Astrophysics
3 units, Aut (Petrosian)

161. Introduction to Extragalactic Astrophysics and Cosmology
3 units, Win (Romani)

262. Introduction to Gravitation and Astrophysics
3 units, Spr (Michelson)

301. Astrophysics Laboratory
3 units, Sum (Walker)

360. Stellar Physics
3 units (Petrosian)
alternate years, given 1998-99

362. High Energy Astrophysics
3 units (Staff) alternate years, given 1998-99

364. Advanced Gravitation
3 units (Staff) given 1998-1999

365. Extragalactic Astrophysics and Cosmology
3 units, Win (Petrosian)
alternate years, not given 1998-99

460. Astrophysics Seminar
1 unit, Aut, Win, Spr (Petrosian)

463. Special Topics in Astrophysics
3 units

ATHLETICS, PHYSICAL EDUCATION, AND RECREATION

Emeriti: (Professor) Wesley K. Ruff; (Associate Professor) Miriam B. Lidster; (Director of Intramurals) William P. Fehring; (Athletic Director) Joseph H. Rueltz; (Associate Director) Robert C. Young

Athletic Director: Ted Leland
Senior Associate Athletic Director: Cheryl Levick
Associate Athletic Director, Development: Jon Denney

Associate Athletic Director, Business and Operations: Valerie Veronin

Assistant Athletic Director, Club Sports, Recreation, and Education Programs: Shirley H. Schoof

Assistant Athletic Director, Operations and Events: Ray Purpur

Assistant Athletic Director, Development: Karen Recht

Assistant Athletic Director, Marketing, Tickets: Bob Carrvaco

Assistant Athletic Director, Football Operations/ Athletic Services: Scott Schuhmann

Assistant Athletic Director, Media Relations: Gary Migdol

Director, Major Gifts: John R. Kates

Athletic Affairs Coordinator: Susan Burk

Director, Intercollegiate Services: Earl Koberlein

Director, Physical Education: Elizabeth P. Weeks

Director, Intramurals: Sherry Posthumus

Senior Lecturers: Anne Gould, Elizabeth Weeks

Sports Directors: Aimee Baker (Crew, women), Steve Bourdow (Sailing), Frank Brennan (Tennis, women), Bobby Clark (Soccer, men), Mark Cook (Gymnastics, women), Dante Dettamanti (Water Polo, men), Wallace Goodwin (Golf, men), Richard Gould (Tennis, men), Sadah Hamada (Gymnastics, men), Chris Horpel (Wrestling), Sheryl Johnson (Field Hockey), Skip Kenney (Swimming, men), Wieslaw Kujda (Crew, men), Vin Lannana (Track and Field), Mark Marquess (Baseball), Mike Montgomery (Basketball, men), Ruben Nieves (Volleyball, men), Caroline O'Connor (Golf, women), Richard Quick (Swimming, women), John Rittman (Softball), Richard Schavone (Diving), Don Shaw (Volleyball, women), Steve Swanson (Soccer, women), John Tanner (Water Polo, women), Zoran Tulum (Fencing), Tara VanDerveer (Basketball, women), Vickey Weir (Synchronized Swimming), Tyrone Willingham (Football)

Sport Assistant Coaches: Barrett Adams (Crew, men), Lonni Alameda (Softball), Beth Alford-Sullivan (Track and Field), Kent Baer (Football), Dana Bible (Football), Dave Borbely
(Football), Josh Burgel (Crew, men), Denise Corlett (Volleyball, women), Lele Forood (Tennis, women), Kristine Franson (Crew, women), Ross Gerry (Swimming, women), Bill Harris (Football), Trent Johnson (Basketball, men), Ted Knapp (Swimming, men), John Kosty (Volleyball, men), Mark Landefeld (Soccer, men), Karen Middleton (Basketball, women), Earle Mosley (Football), Caitlin Mullins (Soccer, women), David Nakama (Baseball), Doug Oliver (Basketball, men), Lisa Posthumus (Fencing), Mark Reiff (Track and Field), Mike Reilly (Track and Field), Mose Rison (Football), Dean Stotz (Baseball), Dave Tipton (Football), Amy Tucker (Basketball, women), Robert Weir (Track and Field), John Whitlinger (Tennis, men), Wayne Wright (Gymnastics, women), Philip Zacharias (Football)

From the founding of the University, Stanford's leaders have believed physical activity is valuable for its own sake and complementary to the educational purpose of the University. The mission of the Department of Athletics, Physical Education, and Recreation is to offer the widest possible range of quality programs for athletic participation and physical fitness at all levels of skill and interest. Within the limitations of its resources, the department provides a broad range of instructional, recreational, and intramural competitive programs for all who wish to participate. The intrinsic value to the participant is the primary criterion by which the worth of the programs should be judged.

The goals of the instructional programs are to promote understanding of the value and role of physical activity as an important dimension of the human condition, to develop performance skills in sport, to develop the habit of participation, and to provide leadership opportunities in aquatics, sports, and other physical activities. To this end, the program encompasses a diversity of learning and participating opportunities from informal recreation through organized intramural competition, basic instructional classes, and theoretical study to, and including, intercollegiate athletic competition.

PROGRAMS
No degrees are offered in Physical Education.

INTERCOLLEGIATE ATHLETICS
In keeping with American university tradition, Stanford offers a broad intercollegiate athletic program. The objectives are to provide the opportunity to compete at the highest possible level without jeopardizing the integrity of the individual or the institution; to adhere strictly to all University, association, and conference rules governing athletic participation; and to encourage effectively the achievement of academic goals by student athletes at the same rate as other University students. As a member of the National Collegiate Athletic Association (NCAA), Stanford fields both men's and women's varsity teams. Those for men are baseball, basketball, crew, cross country, fencing, football, golf, gymnastics, sailing, soccer, swimming and diving, tennis, track and field, volleyball, water polo, and wrestling. Those for women are basketball, crew, cross country, fencing, field hockey, golf, gymnastics, lacrosse, sailing, soccer, softball, swimming and diving, synchronized swimming, tennis, track and field, volleyball, and water polo.

Both men's and women's teams are affiliated with the Pacific Ten Conference, one of the premier athletic conferences in the nation. Additional or alternative intercollegiate athletic competition is available for all teams.

CLUB SPORTS
The Stanford Club Sports program is coeducational. It provides competition in sports not included in the intercollegiate varsity program and instruction in classes or activities not included in the Physical Education program. It also develops student leadership in organizing, administering, and funding activities. The club program is actively supervised by the Director of Club Sports, but the emphasis is on student interest and leadership to initiate, organize, and conduct the respective clubs. Those students in clubs that meet the criteria for inclusion in the formal curriculum may apply for units of credit. Club sport teams competing against other college, university, and/or club teams and requiring eligibility certification for their team members must make such arrangements through the Director of Club Sports, Shirley Schoof.

INTRAMURAL SPORTS (IM)
Students interested in intramural competition may receive information from the IM Office in Burnham Pavilion through their campus residencies. The program includes formal competition in league and tournament play for many different sports leading toward the All-University, Coed, and Women's Intramural championships. Competing organizations, teams, and individuals are urged to contact the IM office on the day before the start of classes to obtain meeting dates and times. Each quarter's printed materials and IM handbooks are available on or after the day before the start of classes. The intramural manager meetings are held the first Wednesday of the first week of classes each Autumn, Winter, and Spring Quarters.

RECREATION
The department provides facility use for faculty, staff, and students (and, for some activities, their immediate families) to participate in aquatics.
conditioning, and sports for general recreation. Specific recreation hours for all the facilities are publicized throughout the year both in the Stanford Report and at the respective facilities.

The golf course and driving range are available for faculty, staff, and student use on a fee basis; information is available from the Golf Pro Shop. For further information about recreation opportunities, contact the Recreation Coordinator, Shirley Schoof.

FACILITIES

Athletic facilities are located throughout the campus. The dance studio (for classes and dance concerts), small activity rooms, a multipurpose gymnasium, a fencing center, an outdoor swimming pool, a weight room, and a large playing field are located at Roble Gym on the west side of campus as well as lighted tennis courts near Governor's Corner. The east side of campus includes the Arrillaga Family Sports Center, which has a recreational weight room and wrestling room, intramural fields, outdoor volleyball courts, and tennis courts. Multipurpose rooms for aerobics, badminton, basketball, gymnastics, martial arts, and volleyball are included in the Ford Center for Sports and Recreation. The DeGuerre Complex houses swimming and diving pools as well as handball, racquetball, and squash courts.

The 18-hole championship golf course, a driving range, a sailing center, and a rowing facility are also available for the department's broad program.

CURRICULUM AND SERVICES

The diverse instructional program accommodates the sports interests of all undergraduate and graduate students. Only intercollegiate varsity men's and women's teams are limited to undergraduates. Homogeneous skill groupings and limited class sizes enable the beginning student or the advanced performer to achieve success within the limits of individual motivation and potential. Skill level in, and knowledge about, a specific activity as well as available space during class list signing are the only limitations to enrollment. Physically handicapped students are encouraged to contact the Director of Physical Education, Elizabeth Weeks, for enrollment advice.

Academic Credit—Activity classes carry 1 unit of credit for satisfactory completion of work. Although there is no limitation on the number of activity classes in which a student may enroll, no more than 8 units of these activity classes (and/or other University activity classes) may be applied toward undergraduate graduation requirements (see the “Undergraduate Degrees” section of this bulletin).

Auditing—No auditing is allowed in activity classes. Faculty and staff may take an activity class as space is available with instructor consent after student enrollment is completed.

Class Fees—Fees are charged for enrollment in aerobics, fencing, golf, horsemanship, lifeguard training, martial arts, sailing, tennis, weight training, yoga and club sports classes.

Class fees are payable only by check or money order. Cash is not acceptable. Checks or money orders should be made payable to Stanford University. Fees are payable at the first and are required by the second class meeting for a student to remain in class. Late enrollees must submit fees no later than the second time they attend the class.

Full refund is given to students who drop a class during the first two weeks of classes and request a refund at that time. No refund is given if a student either neglects to request a refund under the conditions listed previously or drops the class after the second week.

Class Sign-Ups—Not all classes require sign-ups. Those that do are listed, along with time and alphabetical listing under Athletics in the Time Schedule for Autumn, Winter, and Spring Quarters. Sign-ups take place in Roble Gym the day before instruction begins. A student is not registered for a class until he/she submits his/her study list.

Equipment—Students provide their own rackets for tennis. Specific information on equipment and recommended class attire is available from the department or instructor.

Lockers—Lockers are available for rent to faculty/staff and students at the Arrillaga Family Sports Center and Roble Gym. The fee for faculty/staff is $15 a quarter or $40 a year. The fee for students is $10 a quarter or $25 a year.

COURSES

(AU) indicates that the course is subject to the University Activity Unit limitations (8 units maximum).

PHYSICAL EDUCATION AND SPORTS THEORY

190. Analysis of Human Movement—Overview of skeletal and muscular anatomy and a study of the mechanical principles of movement as related to efficient performance in aquatics, dance, and sports.

3 units, Aut, Win (Weeks)

LEADERSHIP OPPORTUNITIES IN PHYSICAL EDUCATION

81. Manager: Athletic Team—For student managers of intercollegiate teams. Prerequisite: consent of respective varsity team head coach. (AU) 1 unit, Aut, Win, Spr (Staff)

142. Teacher Training: Student Assistant—Directed observation, individual and small group in-
struction, organization, supervision and assistance; evaluation of skill performances, and other activities as directed by master teacher. Prerequisite: consent of instructor. (AU)

1 unit, Aut, Win, Spr (Staff)

AQUATIC ACTIVITY AND THEORY

78. Lifeguard Training—Aspects of professional lifeguarding: lifeguard characteristics and responsibilities, recognition of hazards and emergencies, patron and facility surveillance, interaction with the public, rescue skills. Community first aid and CPR for the professional rescuer. Priority to those with summer jobs requiring certification; bring letter from employer to first class meeting. Prerequisite: pass swim test (swimmer/advanced swimmer level); see instructor for details. Fee.

2 units, Spr (Weeks)

106. Sailing: Beginning Keelboat—Basic skills, theory, and techniques to enable beginners to sail with confidence. Emphasis on safety and seamanship skills. Fee. (AU)

1 unit, Aut, Spr (Bourdow)

107. Sailing: Beginning Dinghy—Basic skills, theory, and techniques to enable beginners to sail with confidence in small centerboard boats. Fee. (AU)

1 unit, Aut, Spr (Bourdow)

108. Sailing: Intermediate—Refinement of skills. Introduction to racing. Fee. Prerequisite: consent of instructor. (AU)

1 unit, Aut, Spr (Bourdow)

109. Sailing: Advanced—Refinement of heavy weather sailing skills, with emphasis on racing. Fee. Prerequisite: 108 or consent of instructor. (AU)

1 unit, Spr (Bourdow)

130. Swimming I: Beginning—For non-swimmers or those who can swim about 10 yards but are not comfortable in deep water. Instruction in safety skills, front crawl, and a back stroke. Additional strokes introduced as ability warrants. (AU)

1 unit, Aut, Spr (Dettamanti, Weeks)

131. Swimming II: Advanced Beginning—For those with limited swimming ability and safety skills. May not be fully comfortable in deep water. Work on safety skills, crawl, and elementary backstroke or back crawl. Introduction to sidestroke and breaststroke. Improve skills and increase time and distance of swim. Prerequisite: ability to swim 25-50 yards on front and on back reasonably comfortably. (AU)

1 unit, Aut, Win, Spr (Gerry, Weeks)

132. Swimming III: Intermediate—Continued work on crawl, elementary backstroke, backstroke, and sidestroke. Safety skill work as needed. Introduction to or review of breaststroke. Open turns. Introduction to butterfly, flipturn, and conditioning. Prerequisites: fair technique in crawl, elementary backstroke, backstroke; some sidestroke and breaststroke; ability to swim approximately 100-200 yards continuously by mixing strokes. (AU)

1 unit, Aut, Win, Spr (Gerry, Weeks)

133. Swimming IV: Advanced—Review and refinement of all basic strokes and safety skills. Introduction to or review of butterfly and flipturn. Stroke drills and information on conditioning and designing individual workouts. Prerequisite: average to good strokes; ability to swim approximately 400-500 yards continuously. (AU)

1 unit, Aut, Win, Spr (Dettamanti, Quick)

134. Swim Conditioning—For students wanting to improve cardio-respiratory endurance through directed swimming workouts. Technique corrections as needed. Prerequisite: advanced swimmer. (AU)

1 unit, Aut, Win, Spr (Dettamanti, Kenney, Knapp)

166. Water Polo: Beginning—Introduction to basic skills and game play. For those who have never played or have had limited experience. (AU)

1 unit, Spr (Dettamanti)

167. Water Polo: Intermediate/Advanced—Further work on skills. Game strategies. (AU)

1 unit, Aut, Spr (Dettamanti)

171. Water Safety Instructor—Learning to teach swimming and community water safety. Not for teaching lifeguarding. Extensive textbook readings and written assignments. American Red Cross certification for successful course completion. Priority to those with summer jobs requiring certification; letter indicating same required at first class meeting. Prerequisites: 17 years old by end of course, pass swimming skills at Red Cross Learn to Swim Level VI (advanced swimmer) and pass a water safety test and written test; see instructor for details.

3 units (Weeks) alternate years, given 1998-99

FITNESS, INDIVIDUAL, AND TEAM SPORT ACTIVITIES

2. Aerobics—High-powered strength building class. Focus is on body awareness, balance of strength, and flexibility through continuous body motion and cardiovascular enhancement. All levels. (AU)

1 unit, Aut, Win, Spr (Coughlin)

20. Conditioning—Introduction to basic principles of conditioning. General knowledge of physiological aspects of conditioning, fitness parameters, and principles of training. Emphasis on proper stretching, monitoring of heart rate, correct techniques of running, and development of own fitness program. May include introduction to other forms of conditioning and aerobic activities. Individualized according to ability. (AU)

1 unit, Aut, Spr (Lananna, Reiff)
21. Conditioning Advanced—Active participation in conditioning exercises advancing from aerobic to intense anaerobic interval conditioning. Offered by appointment. Must have passed a physical exam prior to enrollment in class. (AU)
1 unit, Win (Wateska)

38. Fencing: Beginning—Basic footwork and foil techniques. Practice in drilling and bouts. Fee. (AU)
1 unit, Aut, Win (Posthumus)

39. Fencing: Intermediate/Advanced—Continuation of 38; introduction of electrical épée fencing. Fee. Prerequisite: 38 or consent of instructor. (AU)
1 unit, Win (Posthumus)

45. Field Hockey: Advanced for Women—Understanding of techniques and skills under competitive pressure. Must know team strategies and positioning. Prerequisite: varsity competition. (AU)
1 unit, Win (Johnson)

52. Golf: Beginning—Fundamentals of golf swing, introduction to putting, chipping, sand play. Golf etiquette and knowledge of rules to enable a beginner to play a round of golf. Fee. (AU)
1 unit, Aut, Win, Spr (Hamada, Miller, Stotz)

54. Golf: Intermediate—Improvement through the use of drills and practice on all facets of golf game. Utilization of these skills in the game. Learn to lower your score and manage your game on the course. Fee. Prerequisite: 52 or the equivalent. (AU)
1 unit, Aut, Win, Spr (Miller)

55. Golf: Advanced—Understanding of and refining the golf swing and increasing power, distance, and accuracy. Course management, mental preparation, visualization techniques. Fee. Prerequisites: 54 or experience playing and practicing and the ability to hit shots with relative accuracy and distance. (AU)
1 unit, Aut, Win, Spr (Miller)

59. Gymnastics: Beginning—Fundamental gymnastics movement for men and women, including flexibility and strength exercises taught on the Olympic apparatus (e.g., floor, balance beam, bars, rings, etc.). (AU)
1 unit, Aut, Win, Spr (Hamada)

60. Gymnastics: Intermediate/Advanced—For students who have completed the beginning gymnastics course or have a background in gymnastics. Emphasis on tumbling and somersaulting. Group work and individualized instruction for men and women. Limited apparatus work. (AU)
1 unit, Aut, Win, Spr (Cook)

65. Horsemanship: Beginning Riding—No background or very little. Includes walk, trot, and canter. Fee. (AU)
1 unit, Aut, Win, Spr (Saxe, Staff)

66. Horsemanship: Advanced Beginning Riding—Can walk and trot, but not with very secure seat. Gymnastic work develops position and rhythm. Fee. (AU)
1 unit, Aut, Win, Win (Saxe, Staff)

68. Horsemanship: Intermediate Riding and Jumping—Work at the walk, trot, canter. Cross rails up to two foot jumps. Fee. (AU)
1 unit, Aut, Win, Spr (Saxe, Staff)

74. Women’s Lacrosse: Beginning/Intermediate—Introduction to the basics of women’s lacrosse. Emphasis on learning and improving stick skills such as cradling, passing, catching, and shooting, and on an overall knowledge of the game and its rules. (AU)
1 unit, Aut (Staff)

101. Posture—Individual standing posture evaluation; exercises for proper body alignment emphasizing flexibility and balance of muscle strength development; techniques for correct body mechanics: push, pull, lift, carry, reach. Some nutrition, relaxation, and weight management; group and individualized exercise program. (AU)
1 unit, Aut, Win, Win (Weeks)

121. Soccer: Beginning—Introduction to soccer for the true beginner. The rules of the game and basic skills for dribbling, passing, control, shooting and defending. Small game tactics. (AU)
1 unit, Aut, Win, Spr (Clark, Swanson)

122. Soccer: Intermediate—The basic skills and rules of the game. Small group tactics offensively and defensively. Improving players through drills and small-sided games. (AU)
1 unit, Aut, Win, Spr (Clark, Swanson)

123. Soccer: Advanced for Men—Technique under pressure, small group and team tactics. Fitness for the soccer player. Prerequisites: consent of instructor, tryouts. (AU)
1 unit, Win (Clark)

124. Soccer: Advanced for Women—Technique under pressure, small group and team tactics. Fitness for the soccer player. Prerequisites: consent of instructor, tryouts. (AU)
1 unit, Win, Spr (Swanson)

148. Tennis: Beginning—Fundamental strokes (forehand, backhand, serve, and net play), rules, and scoring. Fee. (AU)
1 unit, Aut, Win, Spr (Staff)

149. Tennis: Low Intermediate—Intended as a bridge between beginning and intermediate classes. Review of fundamental strokes, and utilization of these skills in a game situation. Prerequisites: beginning-level class or knowledge of rules and scoring and average ability in fundamental strokes, but limited playing experience. Fee. (AU)
1 unit, Aut, Win, Spr (Staff)
150. Tennis: Intermediate—Fundamental stroke review and increased emphasis on singles and doubles tactics. Prerequisites: low intermediate class or average ability in fundamental strokes and regular playing experience. NTRP rating of 3.0 or equivalent. Fee. (AU)

1 unit, Aut, Win, Spr (Staff)

151. Tennis: Advanced—Review of fundamental strokes. Drills to emphasize footwork, serve and return, approach shots, volleys, lobs, and overheads. Strategy for competition in singles and doubles. Prerequisites: well above average stroking and game playing ability; NTRP rating above 4.0 or equivalent. Fee. (AU)

1 unit, Aut, Win, Spr (Staff)

152. Tennis: Tournament—Advanced drills and practice sessions for tournament-experienced players of near-varsity-level ability. Tryouts at Varsity Courts in Autumn Quarter for autumn enrollment and position on all-University ladder for winter and spring classes. Prerequisite: consent of instructor. Fee. (AU)

1 unit, Aut, Win, Spr (Staff)

154. Tennis: Analysis—Use of computer for analyzing tennis matches. Assist players and coaches by collecting data on player performance. Prerequisite: consent of instructor. Recommended: excellent knowledge of tennis, background in computers and statistics. (AU)

2 units, Aut, Win, Spr (Brennan, D. Gould)


1 unit, Aut, Win, Spr (Corlett, Kosty)

161. Volleyball: Intermediate—Drills to improve skills and game playing strategy. As ability indicates, more emphasis on team play and strategy. (AU)

1 unit, Aut, Win, Spr (Kosty, Nieves)

162. Volleyball: Advanced—Refinement of all skills emphasizing offensive and defensive team play. Prerequisites: strong skills and general knowledge of team concepts. (AU)

1 unit, Aut, Win, Spr (Nieves)


1 unit, Aut, Win, Spr (Staff)

175. Weight Training: Intermediate—Review of basic exercises and techniques. Emphasis on individualized programs and learning use of all available machines and free weights. Further discussion on exercise physiology. Prerequisite: 174 or thorough knowledge of basic weight training principles, Fee. (AU)

1 unit, Aut, Win, Spr (Staff)

177. Weight Training for Women—Introduction to techniques and equipment for weight training. Emphasis on stretching, proper form and progressions, and injury prevention. Basics of physiology of strength training and planning of individual programs. All levels welcome, but designed for the beginner. Fee. (AU)

1 unit, Aut, Win, Spr (Staff)

183. Wrestling: Beginning/Intermediate—Introduces intercollegiate wrestling. Includes conditioning and cultivates the spirit of one-on-one competition. Basic skills and high-level sequences of upper- and lower-body technique. (AU)

1 unit, Spr (Horpel)

188. Yoga/Stretch—Challenging practice for beginners and intermediate yoga students. Designed to balance and integrate the entire body with strength, flexibility, coordination, and concentration. Focus is on breath, directing one's energy, and the 26-30 Asanas. Fee. (AU)

1 unit, Aut, Win, Spr (Coughlin)

MARTIAL ARTS

85. Aikido—"The way of harmony with the principles or forces of nature." A non-aggressive Japanese martial art. Practice develops skills, conditioning, self-confidence, and a spirit of cooperation. Self-defense training in a supportive atmosphere, and at an energy level appropriate for each individual. Fee. (AU)

1 unit, Aut, Win, Spr (Doran)

87. JKA Shotokan Karatedo—Traditional karate training to maximize one's speed and power through discipline and perfection of form. Ideal for self-defense; develops conditioning and flexibility. Beginner's class offered every quarter. Stanford chapter of the Japan Karate Association. Fee. (AU)

1 unit, Aut, Win, Spr (Haramoto)

90. Kenpo Karate: Beginning—Fundamental stretching and conditioning. Introduction to basic moves, self-defense techniques, forms, light sparring. Emphasis on physical/mental control. Simple effective combinations of hands and feet. Physical size has no advantage or disadvantage. Fee. (AU)

1 unit, Aut, Win, Spr (Minneti)


1 unit, Aut, Win, Spr (Minneti)

93. Self Defense—Practical self-defense methods against single and multiple attackers, restraining
arts, striking, and blocking methods. Instruction available through advanced black belt level in jujitsu. Fee. (AU)
1 unit, Aut, Win, Spr (Moses)

94. Shotokan Karate—A weaponless Japanese martial art with roots in Okinawa and China. Cultivates mental strength, physical suppleness, and self-defense skills. Techniques and behavior taught according to traditional methods. All instructors ranked by Shotokan Karate of America, under Tsutomu Ohshima. Periodic training sessions with other SKA collegiate groups. All levels. Fee. (AU)
1 unit, Aut, Win, Spr (Blair)

95. Tae Kwon Do—Tae Kwon Do is a sport, a method of self defense, and a way of life in the Taoist tradition, e.g., appreciating, learning from, and working with whatever happens. The result of dedicated practice is harmony with your surroundings and a happy and serene state of mind, and mental clarity. Fee. (AU)
1 unit, Aut, Win, Spr (Kim)

96. Tai Chi Chuan: Beginning—Trains one in mental tranquility and physical relaxation, improving strength, concentration, body awareness, and unification of action between mind and body. Basic stretching and warm-up exercises plus 24 postures in the Slow Tai Chi Chuan practice. History of Tai Chi and information on how the practice relates to other fields of study. Fee. (AU)
1 unit, Aut, Win, Spr (Chuck)

97. Tai Chi Chuan: Intermediate—The remaining postures of the Slow Tai Chi Chuan exercise and introduction to the two-person exercise (Push-Hands) and basic Wu-Shu postures used to develop more flexibility and leg strength. Fee. (AU)
1 unit, Aut, Win, Spr (Chuck)

98. Tai Chi Chuan: Advanced—Refine and study in greater detail the postures of the Slow Yang and Chen style of Tai Chi Chuan. Related Tai Chi practices such as Fast-Tai Chi, Tai Chi Sword, and Tai Chi Broadsword. Fee. (AU)
1 unit, Aut, Win, Spr (Chuck)

INTERCOLLEGIATE ATHLETIC TEAMS

Varsity men’s and women’s teams in PAC-10 are for the highly talented and motivated undergraduate student. Unless specified, team tryouts are open to men and women students.

14V. Baseball: Varsity (men’s team)—(AU)
1-2 units, Aut, Win, Spr (Marquess, Stotz)

17V. Basketball: Varsity (men’s and women’s teams)—(AU)
1-2 units, Aut, Win (Montgomery, Staff) men’s team
Aut, Win (Van Derveer, Staff) women’s team

26V. Crew: Varsity (men’s and women’s teams)—(AU)
1-2 units, Aut, Win (Kujda) men’s team
Aut, Win, Spr (Baker) women’s team

29V. Cross Country: Varsity (men’s and women’s teams)—(AU)
1-2 units, Aut, Lananna men’s team

35V. Diving: Varsity (men’s and women’s teams)—(AU)
1-2 units, Aut, Win, Spr (Schavone)

41V. Fencing: Varsity (men’s and women’s teams)—(AU)
1-2 units, Aut, Win (Tulum)

46V. Field Hockey: Varsity (women’s team)—(AU)
1 unit, Aut, Win, Spr (Parise)

49V. Football: Varsity (men’s team)—(AU)
1 unit, Aut, Win, Spr (Willingham, Staff)

57V. Golf: Varsity (men’s and women’s teams)—(AU)
1-2 units, Aut, Win, Spr (Goodwin) men’s team
Aut, Win, Spr (O’Connor) women’s team

62V. Gymnastics: Varsity (men’s and women’s teams)—(AU)
1-2 units, Aut, Win, Spr (Hamada) men’s team
Aut, Win, Spr (Cook) women’s team

75V. Lacrosse: Varsity (women’s team)—(AU)
1-2 units, Aut, Win, Spr

111V. Sailing: Varsity (coed and women’s teams)—(AU)
1-2 units, Aut, Win, Spr (Bourdow)

124V. Soccer: Varsity (men’s and women’s teams)—(AU)
1-2 units, Aut, Win, Spr (Clark) men’s team
Aut, Win, Spr (Swanson) women’s team

127V. Softball: Varsity (men’s team)—(AU)
1-2 units, Aut, Win, Spr (Rittman)

136V. Swimming: Varsity (men’s and women’s teams)—(AU)
1-2 units, Aut, Win, Spr (Kenney) men’s team
Aut, Win, Spr (Quick) women’s team

157V. Track and Field: Varsity (men’s and women’s teams)—(AU)
1-2 units, Aut, Win, Spr (Lananna)
163V. Volleyball: Varsity (men's and women's teams)—(AU)
1-2 units, Aut, Win, Spr (Nieves) men's team
Aut, Win, Spr (Shaw) women's team

168V. Water Polo: Varsity (men's and women's teams)—(AU)
1-2 units, Aut, Win, Spr (Dettamanti) men's team
Aut, Win, Spr (Tanner) women's team

184V. Wrestling: Varsity (men's team)—(AU)
1-2 units, Aut, Win, Spr (Horpel)

CLUB SPORTS

The Stanford Club Sports Program is affiliated with the department but is initiated, organized, and conducted by students. All clubs are coeducational except as specified. Clubs, whose instructional classes meet the criteria for academic credit, are scheduled for meeting times as published each quarter in the Time Schedule. For additional information, contact Club Sports Director Shirley Schoof.

11C. Badminton Club Team—(AU)
1 unit, Aut, Win, Spr

32C. Cycling Club Team—(AU)
1 unit, Aut, Win, Spr

36C. Equestrian Club Team—(AU)
1 unit, Aut, Win, Spr

70C. Horse Polo Club Team—(AU)
1 unit, Aut, Win, Spr

72C. Ice Hockey Club Team (men)—(AU)
1 unit, Aut, Win

75C. Lacrosse Club Team (men)—(AU)
1 unit, Aut, Win, Spr

88C. Judo Club Team—(AU)
1 unit, Aut, Win, Spr

104C. Rugby Club Teams (men's and women's teams)—(AU)
1 unit, Aut, Win

118C. Ski Club Team—(AU)
1 unit, Win

159C. Ultimate Frisbee Team (women)—(AU)
1 unit, Aut, Win, Spr

Club Sports

Additional clubs (Bowling, Cricket, Racquetball, Table Tennis and Ultimate Frisbee—men) schedule activities each quarter for no credit.

BIOLOGICAL SCIENCES

Emeriti: (Professors) Winslow R. Briggs, David D. Perkins, David C. Regnery, John H. Thomas, Dow O. Woodward; (Research) R. Paul Levine; (By Courtesy) David C. Fork

Chair: H. Craig Heller


Associate Professors: Barbara A. Block, Deborah M. Gordon, Paul M. Macdonald, Susan K. McConnell

Assistant Professors: David Ackerly, Barbara A. Block, Martha S. Cyert, Judith Frydman, Liquin Luo, Michael F. Rexach, Michael A. Simon, Timothy P. Stearns

Associate Professor (Teaching): Carol L. Boggs

Courtesy Professors: Joseph A. Berry, Olle E. Bjorkman, Christopher Field, Arthur Grossman, Irving L. Weissman

Courtesy Associate Professors: Neil Hoffman, Shauna C. Somerville

Lecturers: Sara Fultz, James Watanabe

Librarian: Michael Newman

The facilities and personnel of the Department of Biological Sciences are housed in the Gilbert Building, Herrin Laboratories, Herrin Hall, the Jasper Ridge Biological Preserve on the main campus, and at the Hopkins Marine Station in Pacific Grove on Monterey Bay.

The department provides: (1) courses designed for the nonmajor, (2) a major program leading to the B.S. degree, (3) a minor program, (4) a coterminal program leading to the M.S. degree, (5) a terminal program leading to the M.S. degree, and (6) a program leading to the Ph.D. degree.

Course work and laboratory instruction in the Department of Biological Sciences conform to the “Policy on the Use of Vertebrate Animals in Teaching Activities” section of this bulletin.

The Jasper Ridge Biological Preserve is a 1,200-acre natural area containing an unusual diversity of plant communities. It is managed solely for teaching and research purposes and is available to investigators from various institutions. Stanford-based research at Jasper Ridge currently concentrates on physiological, ecological, and population studies.

Special laboratory facilities for marine research are described in the pamphlet Hopkins Marine Station, available at the department's Student Services office (Gilbert 108) or from Hopkins Marine Station.

The department’s large collections of plants (Dudley Herbarium), fishes, reptiles, and amphib-
ians, as well as smaller collections of birds, mammals, and invertebrates, are housed at the California Academy of Sciences in San Francisco, where they, and extensive collections of the academy, are available to those interested in the systematics of these groups. Entomological collections, restricted to those being used in particular research projects, are housed in the Herrin Laboratories. No general collections are maintained except for teaching purposes.

The Falconer Biology Library in Herrin Hall contains over 1,200 current subscriptions and an extensive collection of monographs and reference works. A specialized library is maintained at the Hopkins Marine Station.

**UNDERGRADUATE PROGRAMS**

**BACHELOR OF SCIENCE ADVISING**

Most members of the Biological Sciences faculty are available for advising on such academic matters as choice of courses and career plans. The Student Services office maintains a current list of faculty advisers, advising schedules, and research interests.

The Student Services office is prepared to answer questions on administrative matters, such as requirements for the major, approved out-of-department electives, transfer course evaluations, and petition procedures. This office also distributes the department's *Bachelor of Science Handbook*, which delineates policies and requirements, as well as other department forms and information handouts.

Each undergraduate student interested in the major in Biological Sciences is required to select a department adviser as part of the major declaration process. Students who plan to attend medical or graduate school, enroll in the honors or coterminal programs, take courses at Hopkins Marine Station, or attend one of the overseas campuses will find their faculty adviser particularly helpful.

**REQUIREMENTS**

Candidates for the B.S. degree must complete:

**Core Courses and Electives**

<table>
<thead>
<tr>
<th>Courses</th>
<th>Units</th>
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<tbody>
<tr>
<td>Biology 31</td>
<td>5</td>
</tr>
<tr>
<td>Biology 32</td>
<td>5</td>
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<tr>
<td>Biology 33</td>
<td>5</td>
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<tr>
<td>Biology 44X</td>
<td>4</td>
</tr>
<tr>
<td>Biology 44Y (may be replaced by 4 units of 175H)</td>
<td>4</td>
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<td><strong>Total</strong></td>
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</tbody>
</table>

**Electives**

Required Cognate Courses—

Students may take up to two cognate courses Credit/No Credit (CR/NC).

1. Introductory, organic, and physical chemistry with lab: Chemistry 31, 33, 35, 36, 130 (or 132), 131, 135 (or 171). For those interested in population biology, an advanced math course of 100-level or above may be substituted for 130 or 132 upon petition.
2. General Physics: Physics 21, 22, 23, 24; or 41, 43, 45, 47.
3. Mathematics through calculus: Math. 19, 20, 21; or 41, 42.
4. One additional course in mathematics, statistics, or computer science: Math. 43 or beyond; Biology 141 (if taken to fulfill additional cognate requirement, this does not count toward the 24 elective unit requirement), or Psychology 60; Statistics 60 or beyond; or Computer Science 106A.

Electives must be 100-level or above and selected from the offerings in the Department of Biological Sciences or from the list of approved out-of-department electives. This list may be obtained from the Student Services office. Biology majors must include two courses of at least 3 units each (taught by two different Biological Sciences faculty members) in the courses they take to fulfill the department’s 24 elective unit requirement.

In response to rapid changes in the field and to the need for increasing rigor of training, the department’s faculty has adopted a new set of upper-division requirements for the class of 1996 and beyond.

The program for the junior and senior year should include a total of 24 elective units beyond the core. The courses making up these units should include at least one course from at least three of the following four areas. The rest of the 24 units can include more courses from this central menu, courses available in diverse areas directly after the core, or advanced courses for which “menu” courses are prerequisites.

Central menu courses are:

1. **Molecular**
   - Biochemistry: Biochem. 200
   - Genetics: Bio. 118 (may be used to satisfy either area I or area II requirement)
   - Molecular Biology: Bio. 119 or Biochem. 201

2. **Cell/Developmental**
   - Cell Biology: Cellular Dynamics: Bio. 129
   - Cell Biology: Molecular Organization: Bio. 128
   - Developmental Biology: Bio. 123
   - Genetics: Bio. 118 (may be used to satisfy either area I or area II requirement)

3. **Organismal**
   - Comparative Animal Physiology: Bio. 162H
   - General Botany: Bio. 120
   - Human Physiology: Bio. 112
   - Invertebrate Zoology: Bio. 161H
   - Microbiology: Microbio. & Immun. 185
   - Neurobiology: Bio. 153
Vertebrate Biology: Bio. 110 (lecture only)
Viruses: Bio. 213

4. Population
Behavioral Ecology: Bio. 145
Evolutionary Genetics: Bio. 111
Oceanic Biology: Bio. 163H
Principles of Ecology: Bio. 142
Principles and Practice of Biosystematics: Bio. 184

No more than 6 units from any combination of individual instruction courses (143, 175H, 198, 199, 290, 291, or 300) may be applied toward the total number of elective units. No more than 6 units applied toward the elective unit requirement may be taken CR/NC.

Students intending to pursue research careers in biology, especially in ecology, population genetics, or theoretical biology, should be aware that Math. 19, 20, 21, or Math. 41, 42 are minimum mathematics requirements for the B.S. degree in Biological Sciences. Substantial additional training in mathematics, including differential equations, linear algebra, and probability theory is often highly advisable. Students should consult Biological Sciences faculty to discuss individual needs.

Additionally, even though only two or three quarters of physics are required, students should be aware that many graduate and professional schools (for example, medicine and education) require a year of general physics with a lab. Biological Sciences majors are therefore advised to take the year-long physics sequence Physics 21, 22, 23, 24, 25, 26 (or Physics 41, 43, 45, 46, 47, 48).

For students considering residence at Hopkins Marine Station during the junior or senior year, or an overseas program, the department recommends fulfilling as many University General Education Requirements as possible in the first two years at Stanford. A student may use 175H for up to 6 departmental elective units (these are considered research units). For information, contact the Student Services office.

TYPICAL SCHEDULE FOR A FOUR-YEAR MINIMUM PROGRAM

FIRST YEAR

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
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<tr>
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<tr>
<td>Chem. 31, 33, 35, 36</td>
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<tr>
<td>Math. 19, 20, 21. Calculus and Analytic Geometry</td>
<td>3  3  4</td>
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<td>Freshman requirements or electives</td>
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<tr>
<td>Totals</td>
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SECOND YEAR

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<th>Course No. and Subject</th>
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</thead>
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<tr>
<td>Bio. 31. Principles of Biology</td>
<td>5  5</td>
</tr>
<tr>
<td>Bio. 32. Principles of Biology</td>
<td>5</td>
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</table>

Bio. 33. Principles of Biology 5
Bio. 44. Core Experimental Laboratory 4 4
Chem. 130 or 132, 131, 135 (or 171) Organic and Physical Chemistry 8 3
General Education Requirements or electives 3 5 8
Totals ........................................ 16 17 17

THIRD YEAR

| Physics 21, 22, 23, 24. Introductory Physics | 4  4  |
| General Education Requirements or electives | 11 11 15 |
| Totals ....................................... | 15 15 15 |

FOURTH YEAR

<table>
<thead>
<tr>
<th>Electives</th>
<th>A  W  S</th>
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<tr>
<td>15 15 15</td>
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</tbody>
</table>

TRANSFER STUDENTS

Because of differences between Stanford undergraduate courses and prerequisites and those of many other institutions, transfer students may face problems not encountered by entering freshmen. Transfer students are strongly urged to visit the Student Services office in Gilbert 108 during Transfer Orientation to obtain information on credit evaluations. Course catalogs, syllabi, and/or lecture notes from the former institution are necessary in the evaluation and accreditation process. Transfer students are encouraged to find a faculty adviser soon after arrival.

All transfer courses intended to fulfill department requirements must be evaluated on Evaluation of Transfer Course Content forms (available in the Student Services office), which is kept in the student's file. This department procedure is in addition to the process of having units earned at other institutions transferred for Stanford credit and which appear on the Stanford transcript.

The department authorizes transfer credit only for courses whose content parallels the Stanford courses and that have comparable prerequisites (not merely a comparable course title). To substitute a course taken elsewhere for an upper-division Stanford course, course content must be approved by a department faculty member teaching in the area of the course. Submit as complete a course description as practical (including prerequisites and their descriptions) using the Evaluation of Course Content form available in the Student Services office before taking an off-campus course. Credit for natural history, culture-biology, and similar courses is rarely appropriate and can be obtained only by meeting the same criteria outlined above. Verification of performance and the number of units are determined after completing the course. Students must provide exams, reading lists, term papers, and other materials for the evaluation. Credit is not allowed for
projects for which the student was paid, nor is credit allowed for work of a purely technical or clinical nature.

HONORS PROGRAM
To graduate with departmental honors, a student must:
1. Complete at least 10 units of an approved (Bio. 199) research project.
2. Obtain at least a 3.0 (B) grade point average (GPA) in all Biological Sciences major requirements taken at Stanford (cognate, core, and elective courses). Grades earned from teaching (290 and 291) and research (175H and 199) are not computed into this GPA.
3. Submit an honors petition proposal to the department's Undergraduate Research Coordinator the fifth Friday of the quarter, two quarters prior to graduation. For instance, students graduating Spring Quarter must submit petitions no later than mid-Autumn Quarter.
4. If graduating in June, participate in the Biological Sciences Honors Symposium by presenting a poster or giving an oral presentation. The symposium is at the end of May. If graduating Autumn or Winter Quarter, produce a poster.
5. Complete and submit, by the end of the quarter of graduation, two signed and bound copies of an honors thesis approved by at least two readers (one of whom must be from the faculty of the Department of Biological Sciences and both Academic Council members). In addition, students must submit two copies of the honors thesis abstract, which now includes name, thesis title, sponsor, and department.

Further information on the honors program, including petition forms, examples of honors posters, theses, and proposals is available in the Group Study Room in Falconer Library. Also, see the Web page "Research and Honors" for more information about the "Honors Program," including requirements, research sponsors, and petition and thesis deadlines: http://www-leland.stanford.edu/group/biosci/undergrad/honors/. Questions should be directed to the Undergraduate Research Coordinator, Dr. Ellen Macdonald (emac@for-sythe; (650) 723-3767; Herrin T252, office hours posted quarterly).

COTERMINAL B.S./M.S. DEGREE
The Department of Biological Sciences admits a limited number of undergraduate students to work for coterminal B.S. and M.S. degrees in Biological Sciences. Students must apply to the program between their seventh and eleventh quarters. They are required to submit a complete application, which includes a statement of purpose, a Stanford transcript, official GRE scores, two letters of recommendation from faculty members in this department, and a list of courses in which they intend to enroll to fulfill degree requirements. A minimum GPA of 3.0 is necessary in all courses required for the undergraduate degree in Biological Sciences. Students must meet all requirements for both the B.S. and M.S. degrees. They must complete 15 full-time quarters (or the equivalent), or three full quarters after completing 180 units. Unit requirements for a coterminal program are 180 units for the bachelor's degree and 45 units for the master's degree. A more detailed description of the coterminal master's degree program may be obtained from the Student Services office.

GRADUATE PROGRAMS
MASTER OF SCIENCE
The M.S. degree program offers general or specialized study to individuals seeking biologically oriented course work, and to undergraduate science majors wishing to increase or update their science background or obtain advanced research experience. Students who have majored in related fields are eligible to apply, but must complete, or have completed by the time of graduation, the equivalent of a Stanford B.S. in Biological Sciences.

The M.S. program consists of Department of Biological Sciences (or otherwise preapproved) course work totaling at least 45 units of academic credit, distributed as follows:
1. A minimum of 36 units must be Department of Biological Sciences courses or approved out-of-department electives (list available in the Student Services Office).
   a) At least 18 of these 36 units must be courses designated primarily for graduate students (generally at the 200-level or above).
   b) At least 9 of the 36 units must be 3-unit or more upper-division courses from the Department of Biological Sciences, taken from three different faculty members. Teaching and research units do not fulfill this requirement.
   c) Up to 9 of these 36 units may be advanced-level cognate courses in chemistry, mathematics, statistics, computer sciences, or physics beyond the level required for the undergraduate degree.

PREMEDICAL, PREDENTAL, AND PREPARAMEDICAL REQUIREMENTS
Premedical, predental, and preparamened students who are not biology majors should take at least the following courses in Biological Sciences: 31, 32, 33, 44X, 44Y, and such upper-division electives as may be recommended by Stanford's Preprofessional Advising office (Undergraduate Advising Center, Sweet Hall).
undergraduate courses in biology, it is recom-
dended that preparation for graduate work include
jointly by this department and the School of Ed-
ucation. In addition to the usual basic
complete background training during the first year
encouraged to apply. Such students are advised
plines, particularly the physical sciences, are also
at the time of initial registration on how they should
en their academic preparation. The program con-
sists of a minimum of 25 units in the teaching field
and 12 units in the School of Education. Detailed
requirements are outlined in the "School of Ed-
ucation" section of this bulletin or may be obtained
from the Admissions Director, School of Educa-
tion.

MASTER OF ARTS IN TEACHING

The Master of Arts, Teaching degree is offered
jointly by this department and the School of Educa-
tion. The degree is intended for candidates who
have a teaching credential and wish to strength-
en their academic preparation. The program con-
sists of a minimum of 25 units in the teaching field
and 12 units in the School of Education. Detailed
requirements are outlined in the "School of Edu-
cation" section of this bulletin or may be obtained
from the Admissions Director, School of Educa-
tion.

TEACHING CREDENTIALS

For information concerning the requirements
for teaching credentials, consult the "School of Educa-
tion" section of this bulletin or address an
inquiry to the Credential Administrator, School of Educa-
tion.

DOCTOR OF PHILOSOPHY

Preparation for Graduate Study—Students seeking entrance to graduate study in Biological
Sciences ordinarily should have the equivalent of
an undergraduate major in Biological Sciences at
Stanford. However, students from other disci-
plines, particularly the physical sciences, are also
couraged to apply. Such students are advised
at the time of initial registration on how they should
complete background training during the first year
of graduate study. In addition to the usual basic
undergraduate courses in biology, it is recom-
manded that preparation for graduate work include
courses in chemistry through organic chemistry,
general physics, and mathematics through calcu-
lus. Reading knowledge of a foreign language is
recommended.

Application, Admission, and Financial Aid—
Prospective graduate students should request
application information, instructions, and mate-
rials from Graduate Admissions, the Registrar's
Office. The department's program is divided into
two separate tracks—one in Population/Evolution
Biology and the other in Molecular/Cell/Integra-
tive Biology. Applications to the two tracks are
evaluated separately; all applicants should specify
the track which interests them. The deadline for
receiving applications is December 15.

Scores on the general test and the advanced
biology, chemistry, biochemistry, or cellular and
molecular biology test of the Graduate Record
Examination (GRE) are required. It is strongly
recommended that the GRE be taken in October
so that scores are available when applications are
evaluated.

Competition for admission to the Ph.D. program
is keen and in recent years it has been possible to
offer admission to only 15 percent of the appli-
cants.

Admitted students normally are offered finan-
cial support in the form of Stanford Presidential
Graduate Fellowships, biology research assistant-
ships, NIH traineeships, or Biological Sciences
 fellowships.

Qualified applicants should apply for predoc-
toral national competitive fellowships, especially
those from the National Science Foundation and
the Howard Hughes Medical Institute. Applicants
to the Ph.D. program should consult their finan-
cial aid officers for information and applications.

General Departmental Requirements—An
admitted applicant is required to fulfill the require-
ments of the University as outlined in the "Grad-
uate Degrees" section of this bulletin and the
department requirements stated below.

Each student must take at least 3 units of course
work under each of four or more Stanford facul-
ty members. Course work is planned in consul-
tation with an advising committee assigned for his
or her track.

1. Teaching experience and training are part of the
graduate curriculum. Each student assists in
teaching one course in the department's core
lecture (31, 32, 33) or lab courses (44X, 44Y),
a second course that can be either a core course
or central menu course, and a third department
course recommended to be an advanced course
in the student's area of specialization.

2. Seminar: each student must present a public
seminar that is evaluated by two faculty mem-
ers. Evaluation consists of meeting with each
faculty member within one week following the
seminar to obtain feedback and signatures.
Faculty may require an additional seminar presentation.

Graduate seminars devoted to the discussion of current literature and research in particular fields of biology are an important means of attaining professional perspective and competence. Seminars are presented under individual course listings or are announced by the various research groups. A department seminar meets on most Mondays at 4 p.m. Topics of current biological interest are presented by speakers from Stanford and other institutions and are announced in the weekly Stanford Report. Graduate students are expected to attend.

3. Third Year and Beyond: each student must meet with the Advising Committee beginning the third year, and each year thereafter prior to the end of the Spring Quarter. The committee signs a form to ensure compliance. During Autumn Quarter of the fourth year, candidates must meet with their committee to evaluate the project and to discuss financial support, if required, beyond the fourth year. Advanced students are encouraged to meet with their committee at least twice a year.

Academic requirements for the two tracks are as follows:

Molecular/Cell/Integrative Ph.D. Track Requirements—

1. First Year:
   a) Advising Committee: shortly after arrival, each entering student meets with the First-Year Advising Committee. The committee reviews the student's previous academic work and current goals and advises the student on a program of Stanford courses, some of which may be required and others recommended. Satisfactory completion of the Core Curriculum (below) is required of all students.
   b) Biology 301: during Autumn Quarter a program of one-hour presentations by the faculty will be announced. Attendance is mandatory for all first-year students.
   c) Core Curriculum: all students are required to take the following courses for a letter grade, unless previous course work has fulfilled these requirements.
      Biology 203: Advanced Genetics
      Biology 214: Cell Biology of Physiological Process
      Biochemistry 201: Advanced Molecular Biology
      A fourth course is selected from the student's area of specialization.

Students specializing in integrative biology may, on consultation with the Advising Committee, substitute one or more of these courses with appropriate graduate-level courses such as Neurobiology 200, 216, 230; Molecular and Cellular Physiology 215; Psychology 228; or Developmental Biology 210.

d) Lab Rotations: successful completion of rotations in three different laboratories is required of all first-year students. As lab space is limited, students with a definite interest in a particular lab should make arrangements as early as possible. Written petitions for exemptions to requirements "Core Curricula" and "Lab Rotations" are considered by the Advising Committee. Approval is contingent upon special circumstances and is not routinely granted.

e) Dissertation Lab: by the end of Spring Quarter, each first-year student is expected to have selected a lab in which to perform dissertation research and to have been accepted by the faculty member in charge. Students and faculty must wait until April 15 to discuss the choice of a dissertation lab. In consultation with that faculty member (who at this point becomes the student's adviser), the student chooses a projected field of expertise that is broader than the research of the adviser's lab, such as Developmental Biology or Plant Biology. Students electing to do a summer rotation at the Hopkins Marine Station may postpone selection of a lab for their dissertation research until the end of Summer Quarter.

2. Second Year: during the second year, each student must pass a two-part qualifying exam.
   a) Area Proposal: the area proposal is a research proposal that lies within the student's field of expertise but is in an area other than that of the proposed dissertation research. The written proposal should be prepared in the same detail as a grant application, including references, plans for specific experiments, and discussion of the interpretation of possible experimental results. The written proposal must be turned in to the chair of the Graduate Studies Committee by the end of Autumn Quarter. Before the end of Winter Quarter, the student is examined orally on the contents of the written proposal and on general knowledge in the student's projected field of expertise, including important cognate areas. The oral examination is administered by the Dissertation Advising Committee (consisting of the adviser and three other faculty members who have agreed to serve on the committee) and one representative from the Graduate Studies Committee. (Three to five representatives from the Graduate Studies Committee are chosen to be available for these committees.)
   b) Dissertation Proposal: before the end of Spring Quarter of the second year, the student must prepare a dissertation proposal
that outlines the student's projected dissertation research. An expert assessment of the current literature is expected. After submission of the proposal to the Dissertation Advising Committee, an oral examination is held. The student's adviser is not present at the examination, which is administered by the other members of the Dissertation Advising Committee and the Graduate Committee representative.

Advancement to candidacy is contingent on satisfactory completion of both proposals and oral exams. The deadline for completion is mid-May, before the annual faculty meeting devoted to evaluation of student progress. Failure to complete these requirements on schedule results in the withholding of graduate stipend.

3. Dissertation and Dissertation Defense: the finished dissertation must be turned in to the student's Reading Committee at least one month before the oral exam is planned. The Reading Committee is comprised of at least three faculty members, two of whom must be Stanford Academic Council members, and is generally comprised of members who have served on the Oral Examination Committee. At least three weeks before the oral exam, the student checks in with the committee and must incorporate any changes they require by the time of the exam. The exam cannot be formally scheduled or publicly announced until the student receives comments; however, the student should make informal arrangements with the committee earlier to ensure that everyone is available on the projected date. A minimum of three weeks is required by the Student Services office to publicize the exam and schedule appropriate rooms.

Language Requirement—A reading knowledge of a modern scientific language (ordinarily French or German) is recommended at the time of entry. If an entering student is deficient, the advising committee and the student should carefully weigh the value of language study compared to other needs and decide whether the student should undertake the further study of a foreign language.

Residency Requirement—A minimum of nine quarters of full-time graduate registration is required of each candidate. The department normally accepts only full-time students for study leading to the Ph.D. degree.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

Additional courses not listed here are frequently offered by selected postdoctoral or advanced Ph.D. personnel in the areas of their special research competence. They are listed in the quarterly Time Schedule, with course descriptions available in the Student Services office.

INTRODUCTORY

2. Current Research Topics in Biological Sciences—Primarily for sophomores, enrollment limited to prospective and declared Biological Sciences majors. Weekly seminars by faculty on current research in biological sciences. Molecular biology and genetics; theory and mathematics in biology; ecology, physiology, and the environment; molecular and cellular aspects of neurobiology, immunology, and developmental biology; biological chemistry; behavioral biology;
evolution. Prerequisite: prior or concurrent enrollment in Biology core, or consent of instructor.


1 unit, Win, Spr (E. Macdonald)

8S. Introduction to Human Physiology—Preparation for the college premedical curriculum through an overview of human physiology. Topics: biochemistry, nervous system, respiratory system, major organs, metabolism, and disease. Prerequisite: one year of high school chemistry. Recommended: anatomy or general biology.

3 units, Sun (Staff)

10. The Study of Life: From Cells to Ecosystems—How biological processes are described, understood, and analyzed at the level of cells, organisms, and ecosystems. Human disease, exercise physiology, and global environmental changes illustrate what we know about living systems and how we know it. GER:2a (DR:5)

3 units, Spr (Ehrlich)

STANFORD INTRODUCTORY SEMINARS

Enrollment in seminars 11 through 20 is open primarily to freshmen. Seminars 21 and 22 are open to both freshman and sophomores. Seminars 35-37 are open primarily to sophomores.


3 units, Aut (Walbot)

12N. Stanford Introductory Seminar: The Origin of Species—Preference to freshmen. Close reading of Darwin’s Origin of Species and additional secondary sources. Focus is on the logic of Darwin’s argument (what was the best evidence for evolution at the time the book was written?). What were the weakest points and missing pieces? How does each chapter contribute to the overall argument? How was Darwin’s thinking influenced by social conditions in his day? Oral presentations and a paper required.

3 units, Spr (Ackerly)

13N. Stanford Introductory Seminar: Environmental Problems and Solutions—Preference to freshmen. Students do independent investigations of a current environmental problems, analyzing differing views of them and discussing possible solutions. Each student gives two seminar presentations and leads two seminar discussions. Short, documented position papers are written for policymakers. GER:2a (DR:5)

3 units, Spr (Ehrlich)

14N. Stanford Introductory Seminar: Plants and Civilization—Preference to freshmen. Lectures, readings, and discussions on the role of plants in the development of civilization. Topics: the use of forests, woodlands and grazing lands, centers of origins and spread of crops, the development of grains and fruits, viticulture, the spice route, the use of plants as medicine, fungi in human affairs, the global spread of weeds, engineering plants for the future. GER:2a (DR:5)

3 units, Spr (Mooney)

15N. Stanford Introductory Seminar: Environmental Literacy—Preference to freshmen. Lack of public understanding of the details of most environmental problems is cited as a cause of environmental deterioration. Good citizenship requires literacy about the elements of the scientific and decision-making processes that accompany most environmental issues: what can happen, what are the odds, how can the credibility of various sources of expertise for the above be assessed, and what components of the debate deal with factual and theoretical issues and which are political value judgments? Student-led discussions, student peer review and revised term papers. GER:2a (DR:5)

3 units, Win (Schneider)

16N. Stanford Introductory Seminar: Island Ecology—Introduction and illustration of the ways that ecologists think about the world. Focusing on the Hawaiian Islands: their origin, geology, climate, the evolution and ecology of their flora and fauna, and the distribution and functioning of Hawaiian ecosystems. The reasons for the concentration of threatened and endangered species in Hawaii, the scientific basis for their protection and recovery. The ways in which knowledge of island ecosystems can contribute to ecology and conservation biology on continents. GER:2a (DR:5)

3 units, Win (Vitousek)

17N. Stanford Introductory Seminar: Biotechnology and Society—Preference to freshmen. Lectures, readings, and discussion on topics related to the impact of biotechnology on society. Examples include the cloning of mammals, genetic screening, release of recombinant organisms, and genetic engineering of food. Lectures explain the methodology and the biological concepts associated with these technical developments. Student-led discussion focus on the societal consequences. GER:2a (DR:5)

3 units, Spr (Hoffman)

18N. Stanford Introductory Seminar: Plant Genetic Engineering—Preference to freshmen. Flavor-Savr tomatoes, Round-Up Ready soybeans, plas-
tic plants. Lectures, readings, and discussions about genetically modified plants. A survey of crop modifications that have been made or are currently in development. Discussions of the scientific basis of genetic engineering in plants and its social, economic, and environmental consequences. Oral presentations and short term papers. GER:2a (DR:5)

3 units, Win (C. Somerville, S. Somerville)

19N. Stanford Introductory Seminar—Sex and Gender: An Evolutionary Perspective—Preference to freshmen. Themes: the feminist literature on gender and its social construction, mathematical theory for the evolution of sexual reproduction, and case studies of gender characteristics among animals and plants. Evolutionary studies from biology contribute to the understanding of gender, a topic mostly considered in the humanities and social sciences. Readings/discussion, term paper. Computer programming.

3 units, Win (Roughgarden)

20N. Stanford Introductory Seminar: Pattern Formation in Biology—Preference to freshmen. The patterns in plants and animals have drawn attention on aesthetic and scientific grounds. The patterns are species-specific; how can the genes produce them? Gene products are typically macromolecules in solution. By what scheme can they produce the digits of the hand or the spirals of a pine cone. Plausible mechanisms in diverse organisms. Students develop a working facility with the basic concepts of calculus, essentially at the graphical level, analyzing pattern formation.

3 units, Spr (Green)

21N. Stanford Introductory Seminar: Readings in Molecular Biology and Genetics—Preference to freshmen. In-depth discussion of original research papers, parallel to what is being lectured on concurrently in Bio. 31. How to critically read original research papers to interpret and evaluate experimental findings on your own. Corequisite: 31.

3 units, Aut (Baker)

22N. Stanford Introductory Seminar: Infection and Immunity—Preference to freshmen. The causes and prevention of infectious diseases, focusing on the interplay between pathogens and the immune system that determines the outcome of the disease. The basic principles of microbiology, immunology, and epidemiology. Discussion of diseases of the past (smallpox and syphilis) and present (AIDS, TB, and malaria); the roles of geographical, societal, and biological factors in disease spread and prevention. Primary scientific literature, student-led discussions, and written reports. Prerequisite: good biology background, AP biology or introductory college biology (Bio. 31 or 32, or Human Biology 2A, 3A).

3 units, Spr (Jones)

23N. Stanford Introductory Seminar: Experimental Strategy in Microbiology—Preference to freshman. Teaches scientific experimental strategy through examination of classic and modern papers in microbiology. Topics: design, the importance of controls, and the formulation of hypotheses. Readings from original literature (translated to English) including Pasteur, Koch, Beijerinck, and Winozrady; genetic studies by Jacob, Delbruck, etc.; and recent papers on molecular genetics. Reading papers from older literature allows exploration of the scientific process by students in the beginning of the Bio. Core. Corequisite: 31.

3 units, Aut (Long)

36Q. Stanford Introductory Seminar: Strategies of Plant and Animal Development—Preference to sophomores. Directed reading-discussion. How is positional information communicated within the cell population? How do specific cells “know” to differentiate? How are stem cell populations maintained in animals while plants have totipotent meristems? Prerequisites: 31, 32.

3 units (Walbot) not given 1997-98


3 units, Spr (Gordon)

CORE

31,32,33. Principles of Biology—Comprehensive study of the principles of modern biological sciences, taken in sequence, preferably in the sophomore year. Prerequisites: Chemistry 31, 33, 35; Math. 19, 20, 21, or 41, 42.

31. Biochemistry, Genetics, and Molecular Biology—Core lecture dealing with the biochemical and structural basis of cell function, emphasizing macromolecules (proteins, lipids, carbohydrates, and nucleic acids) and how their structure relates to function and to higher order assembly. Topics: enzyme structure, activity and kinetics, metabolism, hormone control, structural genetics, the molecular basis of heredity including nucleic acid and chromosome structure and function, mutagenesis and repair of DNA, and regulation of gene expression. Prerequisites: see above.

5 units, Aut (Rhodes, Simoni, Simon)

32. Cell, Developmental, and Physiological Biology—Core lecture covering cell biology, development, and animal physiology. Topics: cell structure and function; basic concepts in determination, differentiation, and morphogenesis; the principles underlying the exchanges of mass and energy between organisms and their
environments; and organ system specializations, which utilize these principles in adapting organisms to different environments. The mechanisms by which the functions of each system are controlled and regulated. Prerequisites: see above.

5 units, Win (Sapolsky, Cyert, Heller, Luo)

33. Plant and Population Biology—Core lecture covering plant biology, biological diversity, evolution, and ecology. Topics: brief overview of plant physiology and development; control and transmission of genetic variation; evolutionary genetics; physiological, population, community, and ecosystem ecology; and evolution over long time scales. Prerequisites: see above.

5 units, Spr (Gordon, Ray, Vitousek)

44X,Y. Core Experimental Laboratory—Two quarters of lab projects provide a working familiarity with the concepts, organisms, and techniques of modern biological research. Emphasis is on experimental design, analysis of data, and written and oral presentation of the experiments. Lab fee. Prerequisites: Chemistry 31, 33. Recommended: Biology or Human Biology core and statistics; 44X and Y should be taken sequentially in same year. (WIM)

44X. 4 units, Win (Staff)
44Y. 4 units, Spr (Staff)

96A,B. Jasper Ridge Biological Preserve Docent Training Program—Two-quarter preparation for students to serve as docents in the Jasper Ridge Biological Preserve. Aspects of natural history of plants and animals, ecology, archaeology, geology, meteorology, etc., are presented by a variety of faculty and staff. Apply before November 15. Prerequisite: consent of the Jasper Ridge program coordinator.

2 units, Win, Spr (Vitousek)

INTERMEDIATE UNDERGRADUATE AND GRADUATE

111. Evolution and Evolutionary Genetics—Genetics as related to the processes of organic evolution. Theoretical and empirical treatment of population genetics, consideration of field, human genetic studies, aspects of molecular evolution, and coevolution. Prerequisite: Biology core.

4 units, Win (Watt, Feldman)
alternate years, not given 1998-99

112/212. Human Physiology—The functioning of organ systems, emphasizing mechanisms of control and regulation. Topics: structure and function of endocrine and central nervous systems, cardiovascular physiology, respiration, salt and water balance, exercise and gastrointestinal physiology. Lectures/discussion. Prerequisite: Biology or Human Biology core.

4 units, Win (Heller, Harris)

113. Molecular Developmental Biology—Student presentations and discussion of current literature in a selected area of molecular developmental biology. Prerequisites: 119 or equivalent; consent of instructor.

1 unit (Macdonald)
alternate years, given 1998-99

117. Biology and Global Change—(Same as Earth Systems 111.) Biological causes and consequences of anthropogenic and natural changes in the atmosphere, oceans, and terrestrial and freshwater ecosystems. Topics: glacial cycles and marine circulation, greenhouse gases and climate change, tropical deforestation and species extinctions, and human population growth and resource use. Prerequisites: Biology or Human Biology core or graduate standing in any department.

3 units, Win (Vitousek, Mooney)

118. Genetic Analysis of Biological Processes—Basic genetic principles and their experimental applications. Emphasis is on the identification and use of mutations to study cellular function. Prerequisite: Biology core.

5 units, Spr (Cyert, Simon)


3 units, Win (Yanofsky, Schimke, Lipsick)

120. General Botany—The diversity of plant groups plus an introduction to the structure, development, physiology, and ecology of higher plants. Lab. Prerequisites: Biology or Human Biology core, or consent of instructor.

5 units, Aut (Fultz, Green, Mooney, Ray)

123. Developmental Biology—Introduction to the principles of developmental biology, using selected examples of developmental processes from animal systems. Topics: embryogenesis, induction, pattern formation, organogenesis, gametogenesis, etc. Emphasis is on experimental approaches (embryological, genetic, molecular biological) and their design and interpretation. Prerequisites: 31, 32. Recommended: 118, 119.

3 units (Macdonald)
alternate years, given 1998-99

124. Ecosystem Physiology—The physiological ecology of plants ecosystems, and landscapes. Prerequisites: 32, 33; or consent of instructor.

4 units, Win (Mooney, Berry, Field)

125. Ecosystems of California—Principles of ecosystem function with emphasis on vegetation components and on California systems. Prerequisite: 33 or Human Biology 2A.

3-4 units, Spr (Mooney)
128. Cell Biology: Molecular Organization—The biochemistry and biophysics of macromolecules emphasizing how macromolecules interact to form complex cellular structures. Topics: protein biosynthesis and folding, structure assembly and functions of biological membranes and mechanisms of membrane trafficking. Experimental logic and critical interpretation of experimental data. Prerequisite: Biology Core.
   4 units, Win (Kopito, Frydman)

   4 units, Spr (Stearns, Nelson)

130. Algae/Fungi—Introduction to these groups, their utilization in molecular biology in studying biological problems, and their ecological significance. Lectures, lab, field trips. Prerequisite: Biology Core or consent of instructor.
   4 units (Fultz, Grossman)
   alternate years, given 1998-99

132. Developmental Genetics—The uses of the tools of modern genetics to understand outstanding questions in developmental biology.
   3 units, Spr (Baker)

133. Genetics of Prokaryotes—Analysis of prokaryotic genes and genomes with emphasis on the evolution of genetics systems. Prerequisite: 31.
   3 units, Aut (Campbell)

134. Replication of DNA—Modes of DNA replication and their control in prokaryotic and eukaryotic systems. Emphasis on experimental approaches and their limitations. Critical review of current literature in seminar format. Lectures and student reports on specialized topics. Enrollment limited to 14 advanced undergraduates. Prerequisites: 31 and/or consent of instructor.
   3 units, Aut (Hanawalt)

137. Plant Genetics—Gene analysis, mutagenesis, and transposable elements; developmental genetics of flowering and embryo development; biochemical genetics of plant metabolism; lessons from transgenic plant studies. Prerequisites: 31, 32, 33 or consent of the instructor.
   3 units (Walbot)
   alternate years, given 1998-99

138. Ecology and Evolution of Plants—Introduction to the basic principles of ecology and evolutionary biology, focusing on plants. Topics: plants in the environment, population dynamics, natural selection in plant populations, the origin and maintenance of diversity, speciation, extinction, conservation of plant populations. Field trips, independent projects. Prerequisite: 33 or consent of the instructor. Recommended: statistics.
   4 units, Aut (Ackerly)
   alternate years, not given 1998-99

139. Biology of Birds—Ways birds interact with their environments and each other, emphasizing studies that had impact in the fields of population biology, community ecology, and evolution. Students become familiar with local bird communities; emphasis is on field research. One one-hour lecture and one three to five hour lecture or field trip per week. Enrollment limited to 20. Prerequisites: 33 or equivalent, and consent of instructor. Recommended: birding experience.
   3 units (Ehrlich)
   alternate years, given 1998-99

140. Population Biology of Butterflies—Lectures, field studies of the dynamics and genetics of butterfly populations, life histories, and resource utilization. The evolution and taxonomy of this group of insects, which has become a key research tool in population biology. Lab includes field work on Euphydryas populations now under study on campus and elsewhere in California. Students must register both quarters for field work credit. Prerequisites: 33, consent of instructor.
   2-5 units (Ehrlich)
   alternate years, given 1998-99

141. Biostatistics—Introduction to the statistical analysis of biological data. Lectures, discussion, and student exercises.
   4-5 units, Win (Feldman)

   4 units, Aut (Roughgarden)

144. Conservation Biology—(Same as Human Biology 119.) Introduction to the science of preserving biological diversity, its principles, policy, and application. Topics: biology of small populations, extinction, minimum viable population analysis, habitat fragmentation, reserve design and management, the Endangered Species Act, and conflict mediation. Case studies and local field trips illustrate topics. Prerequisite: Biology 33, Human Biology 2A, or consent of instructor.
   4 units, Win (Boggs, Launer)

145/245. Behavioral Ecology—(Graduate students register for 245.) Animal behavior from an evolutionary and ecological perspective. Topics: foraging, territoriality, reproductive behavior, social groups. Lecture/seminar format; seminars include discussion of journal articles. Independent research projects. Prerequisites: Biology or Human Biology.
146. Colloquium on Population Studies—Series of talks by distinguished speakers introducing a variety of approaches to population and resource studies.

1 unit, Win (Feldman)

148. Colloquium on Biosystematics and Evolution—Panel discussion and outside speakers covering diverse topics of current interest in the systematics and evolution of living diversity; sponsored jointly with the California Academy of Sciences.

1 unit, Watt alternate years 1998-99

149. Neural Basis of Sleep and Circadian Rhythms—How the activity of the brain is affected by changes in sleep/wake state. Neurochemistry of changes in brain activity and conscious awareness associated with changes in sleep/wake state. Behavioral and neurobiological phenomena of sleep homeostasis, REM-sleep regulation, circadian rhythms, hibernation, and anesthesia. Enrollment limited to 30. Prerequisite: basic understanding of the nervous system (at least one course from 32, Human Biology 4A, Psychology 70, or consent of instructor).

4 units (Heller, Edgar) not given 1997-98

150/250. Human Behavioral Biology—(Graduate students register for 250.) The biological bases of normal and abnormal human behavior are examined to train students in approaching complex behaviors in a multidisciplinary way. Relevant disparate disciplines: sociobiology, ethology, neuroscience, and endocrinology are integrated in examining behaviors such as aggression, sexual behavior, language use, mental illness.

6 units, Spr (Sapolsky) alternate years, not given 1998-99

151. Mechanisms of Neuron Death—Open to Biology majors with a strong background in neuroscience. Seminar on the cell and molecular biology of neuron death during neurological disease. Topics: the amyloid diseases (Alzheimer’s), prion diseases (kuru and Creutzfeldt-Jacob), oxygen radical diseases (Parkinson’s and ALS), triplet repeat diseases (Huntington’s), and AIDS-related dementia. Lectures, discussions, and student presentations.

3 units, Aut (Sapolsky)

152. Imaging: Biological Light Microscopy—(Same as Molecular and Cellular Physiology 222.) Survey of instruments which use light and other radiation for analysis of cells in biological and medical research. Topics: basic light microscopy through confocal fluorescence and video/digital image processing. Lectures on physical principles; involves partial assembly and extensive use of instruments in projects. Lab. Prerequisites: some college physics, Biology core.

3 units, Spr (S. Smith, Green)

153. Cellular Neuroscience: Cell Signaling and Behavior—(Enroll in Psychology 120.)

4 units, Aut (Wine)

155. Assessment of Chronic, Low-Level Environmental Risks—Seminar. The scientific and policy considerations underlying the regulation of chronic, low-level risks to the environment and public health. Topics: epidemiological evaluation, exposure assessment, toxicology testing and extrapolation from animal studies, the statutes governing toxic substances and other regulation, setting regulatory priorities, managing risks. Students pursue an independent case study on an issue, e.g., asbestos, EMF, lead, chlorination of drinking water supplies, nuclear waste, food additives, etc. Enrollment limited to 25 advanced undergraduates.

3 units (Kennedy, Sagan, North) not given 1997-98

158. Developmental Neurobiology—Lecture/seminar for advanced undergraduates and coterminal master’s students. Principles of nervous system development from the molecular control of patterning, cell-cell interactions, and trophic factors to the level of neural systems and the role of experience in influencing brain structure and function. Topics: neural induction and patterning cell lineage, neurogenesis, neuronal migration, axonal pathfinding, synapse elimination, the role of activity, critical periods, and the development of behavior. Enrollment limited to 75. Prerequisites: 32 or equivalent; and 153 or Neurobiology 200, or consent of instructor.

4 units (McConnell) alternate years, given 1998-99

184/284. Principles and Practices of Biosystematics—The basic principles and major operating procedures of systematic biology; the study of the classification of organisms and of the relationships among them. Concepts and issues common to the study of all organisms; examples from particular groups of creatures.

4 units, Spr (Watt, Gosliner, Jablonski, Ackerly)
### SCHOOL OF HUMANITIES AND SCIENCES

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<tr>
<td>169H/269H</td>
<td>Neurobiology and Behavior</td>
<td>5</td>
<td>Thompson</td>
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<tr>
<td>170H/270H</td>
<td>Seminar: Topics in Marine Biology</td>
<td>1</td>
<td>Win, Spr (Staff)</td>
<td></td>
</tr>
<tr>
<td>171H/271H</td>
<td>Ecological and Evolutionary Physiology</td>
<td>4</td>
<td>Somero</td>
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<tr>
<td>174H/274H</td>
<td>Chance in Biology: Experimental Design and Probability</td>
<td>3</td>
<td>Denny, Watanabe</td>
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<tr>
<td>175H</td>
<td>Problems in Marine Biology</td>
<td>12</td>
<td>Block, Denny, Epel, Gilly, Levine, Powers, Somero, S. Thompson, Watanabe</td>
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<tr>
<td>179H</td>
<td>Subtidal Communities</td>
<td>6</td>
<td>Watanabe</td>
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<tr>
<td>180H/280H</td>
<td>Problems in Subtidal Ecology</td>
<td>6</td>
<td>Watanabe</td>
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<tr>
<td>238H</td>
<td>Biomechanics of Intertidal Organisms</td>
<td>5</td>
<td>Denny</td>
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**UNDERGRADUATE, INVOLVING INDIVIDUAL WORK**

Students majoring in biological sciences are encouraged to pursue directed reading and research opportunities. An introduction to research is provided by Bio. 2.

**191. Research in Bird Biology**—Semi-independent field research in ornithology, emphasizing ecological relationships. Projects complement ongoing research, planned and carried out by the student in consultation with the instructor. Results are written in publication format. Enrollment limited. Prerequisites: 33, concurrent or subsequent enrollment in 139, and consent of instructor.

**194/294. Seminar in Environmental Policy Research**—Principles of and current problems in environmental policy. Lectures, student presentations, and intensive library research or participation in group research project required. May be repeated for credit. Prerequisite: consent of instructor.

3 units, Spr (Ehrlich)

**198. Directed Instruction/Reading**—May be taken as a prelude to research. Read/discuss biology-related literature with a faculty sponsor, possible participation in a lab or research group seminars, and library research. Credit for work arranged with out-of-department instructors restricted to biological sciences majors and requires department approval. See [http://www-leland.stanford.edu/group/biosci/undergrad/honors/](http://www-leland.stanford.edu/group/biosci/undergrad/honors/)

**198H. Directed Instruction/Reading**—For work done under supervision of Hopkins Marine Station faculty.

**199. Undergraduate Research**—Individual research taken by arrangement with in-department or out-of-department instructors. Credit for work arranged with out-of-department instructors restricted to Biological Sciences majors and requires department approval. See [http://www-leland.stanford.edu/group/biosci/undergrad/honors/](http://www-leland.stanford.edu/group/biosci/undergrad/honors/)

**199H. Undergraduate Research**—For undergraduate research done under supervision of Hopkins Marine Station faculty.

**ADVANCED UNDERGRADUATE AND GRADUATE**

**203. Advanced Genetics**—Explores the genetic toolbox. Examples of analytic methods and modern synthetic genetic manipulation, including original papers. Emphasis is on use of genetic tools in dissecting complex biological pathways, developmental processes, and regulatory systems. Graduate students in biological sciences welcome; those with minimal experience in genetics should prepare themselves by working out problems in Suzuki, et al, or Hart, et al.

3 units, Aut (Stearns, Kim, Villeneuve)

**205. DNA Repair and Mutagenesis**—Interactions of endogenous and environmental mutagens with DNA. Responses of living systems to damaged DNA, including molecular mechanisms for DNA repair and recombinational modes. Inducible repair
responses and "error-prone" mechanisms. Human hereditary deficiencies in DNA repair that predispose to cancer. Relationships of DNA repair to mutagenesis and carcinogenesis. Lectures and student oral reports on selected topics and review of current research literature. Prerequisites: 31, 118, and 119, or consent of instructor.

3 units, Spr (Hanawalt)

208. Developmental Biology—(Same as Developmental Biology 210.) Acquaints graduate students and upper-level undergraduates with advances in current developmental biology. Goal: to discover unifying themes in how organismic complexity is generated during embryonic and postembryonic development. The roles of genetic hierarchies, induction events, cell lineage, maternal inheritance, cell-cell communication, and hormonal control in developmental processes in well-studied organisms (mammals, insects, and nematodes). Small groups of students and faculty discuss current papers in depth. Team taught by department faculty. Undergraduate prerequisite: consent of instructor. Recommended: familiarity with basic techniques and experimental rationales of molecular biology, biochemistry, and genetics.

5 units, Spr (Clayton, Crabtree, Fuller, Hogness, Kaiser, Kim, Kingsley, Nusse, Scott, Shapiro, Spudich, Villeneuve, Weissman)

209. Advanced Neurosciences Laboratory—The use of equipment and techniques required to record and analyze extracellular and intracellular activity in vertebrates or other state-of-the-art neuroscience techniques. In-depth training in a subset of these techniques as applied to a specific research project. Students present/critically evaluate representative neuroscience methodologies in weekly discussion groups. Enrollment limited to 10; admission by application (available in Student Services office). Prerequisites: Biology or Human Biology core sequence and core lab (44 or equivalent). Recommended: some advanced course work in neurobiology.

4 units (Heller, Grahn) not given 1997-98


3 units, Spr (Campbell)

214. Cell Biology of Physiological Processes—(Same as Molecular and Cellular Physiology 221.) Basic mechanisms of membrane and cellular biogenesis in relation to physiological processes. Emphasis on regulatory and signaling mechanisms involved in coordinating complex cellular phenomena such as cellular organization, function, and differentiation. Topics: cellular compartmentalization, transport and trafficking of macromolecules, organelle biogenesis, cell division, motility and adhesion, and multicellularity. Prerequisites: Biology core, Biochemistry 201.

5 units, Win (Kopito, W. Nelson)

215. Biochemical Evolution—Lectures/discussion covering biochemical viewpoints on diverse aspects of the evolutionary process. Topics: prebiotic biochemistry and the origins of life; adaptive organization of metabolism; enzyme polymorphisms and other biochemical aspects of population genetics; macromolecular phylogeny and protein clocks. Prerequisites: Biology core or substantial equivalent.

3 units, Aut (Watt)

216. Ecosystem Ecology and Global Biogeochemistry—Nutrient cycling and the regulation of primary and secondary production in terrestrial, freshwater, and marine ecosystems; land-water and biosphere-atmosphere interactions; global element cycles and their regulation; human effects on biogeochemical cycles. Prerequisite: graduate standing in science or engineering; consent of instructor for undergraduates or coterminal students.

3 units (Vitousek)

alternate years, given 1998-99

217. Climate Theory, Modeling, Applications, and Implications—(Same as Civil Engineering 263S.) History of the coevolution of climate and life. Theories of climate, external and internal climatic forcings, definitions of climate and the climate system, and rationale for climatic modeling. Hierarchy of climatic models; interactions among atmosphere, biosphere, oceans, hydrosphere, and cryosphere. Climatic predictability; implications of predictions and relevance to current controversies. Prerequisites: Biology core or Civil Engineering 163 and math through differential equations, or consent of instructor.

3 units, Win (Schneider)

alternate years, not given 1998-99

230. Molecular and Cellular Immunology—For graduate students and advanced undergraduates. Basic components of the immune system: structure and functions of antibody molecules; cellular basis of immunity and its regulation; molecular biology of antigen recognition structures; genetics of immunity and disease susceptibility. Emphasis is on key experimental approaches that have advanced our understanding. Prerequisites for undergraduates: Biology core or consent of instructor.

4 units (Jones) not given 1997-98

237. Introduction to Biotechnology—(Same as Biochemistry 237, Chemical Engineering 237, Civil Engineering 237, Developmental Biology 237, Structural Biology 237.) Faculty from the departments of Biochemistry, Biological Sciences, Chemical Engineering, Civil Engineering, Developmental Biology, Structural Biology, and invited industrial speakers review the interrelated elements of
modern biotechnology. Topics: protein structure and dynamics, protein engineering, biocatalysis, gene expression, cellular metabolism and metabolic engineering, fermentation technology, and purification of biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences or engineering.

3-5 units (Robertson) given 1998-99

242. Theoretical Ecology—Mathematical models in ecology for upper-division undergraduates and graduate students. Topics from behavioral ecology, population dynamics and genetics, and community ecology. Theme varies each year. Prerequisites: differential equations, linear algebra, and computer programming.

3 units, Aut (Roughgarden) alternate years, not given 1998-99

252. Gene Action—Instructor/student presentations of selected studies on gene structure and function, and regulation of gene expression, in prokaryotes. Prerequisites: Biochemistry 201 or equivalent; consent of instructor.

3 units (Yanofsky) alternate years, given 1998-99

256. Plant Physiology—Physiological functions of land plants from analytical and quantitative points of view; photosynthetic energy and gas exchange; water and photosynthesis long-distance transport; mineral nutrient ion uptake and transport; growth at cellular and organismal levels, and its hormonal regulation; responses to light, gravity, temperature, etc. Prerequisite: Biology core.

4 units (Ray)

258. Neural Development—Seminar for graduate students, with optional lectures that meet jointly with 158. Principles of nervous system development from the molecular control of patterning, cell-cell interactions and trophic factors, to the level of neural systems and the role of experience in influencing brain structure and function. Topics: neural induction and patterning, cell lineage, neurogenesis, neuronal migration, axonal pathfinding, synapse elimination, the role of activity, critical periods, and the development of behavior. Enrollment limited to 30. Prerequisites: 32 or equivalent; and 153 or Neurobiology 200, or consent of instructor.

4 units (McConnell) alternate years, given 1998-99


3-4 units, Win (F. Thomas)

280A. Environmental Microbiology I—(Enroll in Civil Engineering 274A.)

3 units, Aut (Spormann)

280B. Environmental Microbiology II—(Enroll in Civil Engineering 274B.)

3 units, Win (Spormann)

280C. Environmental Microbiology III—(Enroll in Civil Engineering 274C.)

3 units, Spr (Spormann)

283. Theoretical Population Genetics—Detailed survey of models in population genetics. Selection, random drift, gene linkage, migration and inbreeding, and the influence they have on the evolution of gene frequencies and chromosome structure. Models related to DNA sequence evolution. Prerequisite: consent of instructor.

3 units, Aut (Feldman)

290. Teaching of Biological Science—Open to upper-division undergraduates and graduate students. Practical experience in teaching lab biology or serving as an assistant in a lecture course. Prerequisite: consent of instructor.

1-5 units, Aut, Win, Spr (Staff)

291. Development and Teaching of Core Experimental Laboratories—Preparation for teaching the core experimental courses (44X and 44Y). Emphasis on lab, speaking, and writing skills. Focuses on updating the lab to meet the changing technical needs of the students. Must be taken prior to teaching either of the above courses. Prerequisite: selection by instructor.

2 units, Aut, Win (Malladi, Yelton, Staff)

PRIMARILY FOR GRADUATE STUDENTS

300. Research—Individual research at the graduate level taken by arrangement with in-department or out-of-department instructors. For graduate students only. Master’s students: credit for work arranged with out-of-department instructors restricted to biological sciences students and requires an approved department petition. See http://www-leland.stanford.edu/group/biosci/undergrad/honors/. “Research and Honors,” other “Research Courses,” finding a lab, research sponsors, units, petition instructions, deadlines, credit for summer research, and out-of-Stanford research, or email emac@forsythe for more information.

300H. Research—For graduate research done under supervision of Hopkins Marine Station faculty.

301. Current Topics in Molecular, Cell, Developmental, Genetics, and Integration Biology—Enrollment limited to Biological Sciences Ph.D. students in the first year of graduate study. Lectures in areas of the faculty’s current research interests first three weeks.

1 unit, Aut (Staff)

302. Current Topics in Population Biology—Required of first-year graduate students in population biology and open to all graduate students.
Discussion of the major conceptual issues and developing topics in population biology.

303. Concepts in Population Biology—Required of first-year graduate students in population biology and open to all graduate students. Discussion of the major conceptual issues and developing topics in population biology.

304. Concepts in Population Biology—Required of first-year graduate students in population biology and open to all graduate students. Discussion of the major conceptual issues and developing topics in population biology.

305. Seminar on DNA Repair and Genetic Toxicology—Literature review and discussion of current research, emphasizing experimental approaches for studying DNA damage processing in bacteria, yeast, and mammalian cells. Enrollment limited to graduate students and advanced undergraduate students doing research in this field.

315. Seminar in Biochemical Evolution—Literature review and discussion of current topics in biochemical evolution and molecular evolutionary genetics. Prerequisite: consent of instructor.

325. Professional Responsibility and Academic Duty—Seminar for dissertation-level Ph.D. candidates who intend academic careers. Topics: teaching and preparation for it, obligations to students, faculty governance, obligations to the institution and conflict of interest, consulting, research and research funding, regulation of the conduct of research, roles of reviewers and editors, intellectual property and academic authorship, misconduct in research, constraints on freedom of publication. Class participation and final paper required. Enrollment limited to 25. Prerequisite: consent of instructor.

333. Seminar in Evolutionary Ecology—Literature review and research discussion on a selected topic in ecology and evolution. Student participation required. Prerequisite: consent of instructor.

339. Plant Cell and Developmental Biology in an Evolutionary Context—Topics: environmental and developmental regulation of morphology and gene expression, the function of vegetative and floral meristem, parameters of plant cellular and tissue growth, canopy structure, epidermal cell specializations and root development. Use of transgenic plants for analysis of development pattern. Discussion sections focus on the original literature.

340. Plant Biochemistry: Cellular, Physiological, and Ecological Aspects—Topics: light regulation of plant processes, photosynthesis and its control, ATP synthesis, respiration, regulation of carbon flux in metabolism, amino acid and lipid biosynthesis, secondary metabolites, plant microbe signal molecules, etc. Emphasis on regulatory interactions at the chemical, organismal, and ecological-global levels. Weekly section meetings focus on the original literature.

342. Plant Biology Seminar—Selected topics in the evolution and ecology of social behavior; discussion of research papers. Prerequisite: consent of instructor.

345. Seminar in Behavioral Ecology—Topics announced at the beginning of each quarter. In-depth coverage of the current literature.

346. Seminar in Genetics and Molecular Biology—Enrollment limited to graduate students directly associated with departmental research groups in genetics or molecular biology.

358. Seminar in Developmental Neurobiology—Enrollment limited to graduate students and advanced undergraduates doing research in developmental neurobiology. Formatted entirely around discussions at the chemical, organismal, and ecological-global levels. Weekly section meetings focus on the original literature.

383. Seminar in Population Genetics—Literature review and research discussion of current problems in the theory and practice of population genetics and molecular evolution. Student participation required. Prerequisite: consent of instructor.

384. Seminar in Theoretical Ecology—(Same as Geophysics 385Y.) Discussions of recent and classical research papers in ecology, and presentation of...
work in progress by seminar participants. Prerequisite: consent of instructor.

1-3 units, Spr (Roughgarden)

DIVISION OF MARINE BIOLOGY HOPKINS MARINE STATION

Emeritus: (Professor) John H. Phillips, Jr.; (Professor-Research) R. Paul Levine
Director: Dennis A. Powers
Professors: Mark W. Denny, David Epel, William F. Gilly, Dennis A. Powers, George N. Somero, Stuart H. Thompson
Associate Professor: Barbara A. Block
Courtesy Professor: Irving L. Weissman
Lecturer: James M. Watanabe

The Hopkins Marine Station is at Pacific Grove, on the south side of Monterey Bay, 90 miles from the main University campus. The 11-acre grounds, on the main portion of Cabrillo Point, include a sheltered landing place and storage for small boats. Buildings include the Lawrence Blinks Laboratory, Alexander Agassiz Laboratory, Jacques Loeb Laboratory, Harold A. Miller Library, Monterey Boat Works, Walter K. Fisher Laboratory, Tuna Research and Conservation Center, and De Nault Family Research Building. The 15,000 volume library subscribes to approximately 450 journals, and its collections are particularly strong in embryology, marine biology, microbiology, and oceanography.

The station is open during the entire year and maintains a permanent staff of resident investigators and technical assistants. The staff is supplemented by visiting faculty members, especially during the summer. There are facilities for visiting investigators and for elementary and advanced instruction in biology. For further information, write Hopkins Marine Station, Pacific Grove, CA 93950.

COURSES

56H. Seminar: History and Philosophy of Science—The nature of scientific inquiry, its logic, historical patterns, and sociology. Emphasis is on the unique aspects of the biological sciences.

2 units, Spr (Somero)

160H/260H. Cell Physiology—(Graduate students register for 260H.) The structures and processes that control life at the cellular level. Topics: membrane structure and function, signal transduction, the cytoskeleton, transport processes, cell division, cell-cell interactions, and motility. Similar to Bio. 121 (Cell Biology), but using marine examples. Three lectures per week. Prerequisites: Biology Core or consent of instructor.

4 units, Win (Epel)

161H/261H. Invertebrate Zoology—(Graduate students register for 261H.) Survey of invertebrate diversity emphasizing form and function in a phylogenetic framework. Morphological diversity, life histories, physiology, and ecology of the major invertebrate groups, concentrating on local marine form examples. Current views on the phylogenetic relationships and evolution of the invertebrates. Three lectures, one lab per week, plus field trips. Prerequisites: Biology core or consent of instructor.

5 units, Win (Watanabe)

162H/262H. Comparative Animal Physiology—(Graduate students register for 262H.) How animals work. Topics: physiology of respiration, circulation, energy metabolism, thermal regulation, osmotic regulation, muscle physiology and locomotion. Discussion of evolutionary and ecological physiology. Three lectures per week. Prerequisites: Physics 21 or 51; Chemistry 31, 135; Biology Core; or consent of instructor.

4 units (Block)

163H/263H. Principles of Oceanic Biology—(Graduate students register for 263H.) How the physics and chemistry of the oceanic environment affects marine plants and animals. Topics: seawater and ocean circulation, separation of light and nutrients in the two-layered ocean, oceanic food webs and trophic interactions, oceanic environments, biogeography, and global change. Three lectures per week; discussion section, and field trips. Recommended: Physics 21 or 51, Chemistry 31, Biology Core, or consent of instructor.

4 units, Win (Denny, Somero)

164H/264H. Marine Botany—(Graduate students register for 264H.) Introduction to plants in the sea. Phytoplankton and oceanic productivity, macrophytes and nearshore ecology, marine angiosperms from taxonomical, physiological, and ecological perspectives. Three lectures, one lab per week. Prerequisites: Biology Core or consent of instructor.

4 units, Win (Staff) alternate years, not given 1998-99

165H/265H. Air and Water—(Graduate students register for 265H.) Introduction to plants in the sea. Phytoplankton and oceanic productivity, macrophytes and nearshore ecology, marine angiosperms from taxonomical, physiological, and ecological perspectives. Three lectures per week. Recommended: Physics 21, 23, or 51, 53; calculus; Biology Core; or consent of instructor.

3 units (Denny) alternate years, given 1998-99

165H/265H. Air and Water—(Graduate students register for 265H.) Introduction to plants in the sea. Phytoplankton and oceanic productivity, macrophytes and nearshore ecology, marine angiosperms from taxonomical, physiological, and ecological perspectives. Three lectures per week. Recommended: Physics 21, 23, or 51, 53; calculus; Biology Core; or consent of instructor.

3 units (Denny) alternate years, given 1998-99
166H/266H. Locomotion—(Graduate students register for 266H.) How animals and plants swim, crawl, run, and fly. The principles of fluid and solid mechanics determine the possibilities and limitations of organismal motion. Three lectures per week. Recommended: Physics 21 or 51, Biology Core, or consent of instructor.
3 units, Win (Denny)
altere years, not given 1998-99

167H/267H. Nerve, Muscle, and Synapse—(Graduate students register for 267H.) Fundamental aspects of membrane excitability and conduction, synaptic transmission, and excitation-contraction coupling. Emphasis is on biophysical, molecular, and cellular level analyses of these processes in vertebrate and invertebrate systems. Labs on intracellular and extracellular recording and patch clamp techniques. Two lectures per week, one lab. Prerequisites: Physics 23, 28, 43, or equivalent; Chemistry 31, 135; calculus; or consent of instructor.
5 units (Gilly)

168H/268H. Seminar: Cellular Signal Transduction—(Graduate students register for 268H.) Lecture/seminar, group discussions. Focus is on the physiology, biochemistry, and molecular biology of signaling cascades, from basic principles to advanced and current topics. Prerequisite: consent of instructor.
1 unit, Aut, Spr (Thompson)

169H/269H. Neurobiology and Behavior—(Graduate students register for 269H.) The neural mechanism responsible for generating animal behavior. Topics: neuronal excitability, synaptic plasticity, signal transduction, and neural circuits. Lectures, discussions, demonstrations, and lab. Prerequisites: Biology Core or consent of instructor.
5 units (Gilly)

170H/270H. Seminar: Topics in Marine Biology—(Graduate students register for 270H.) A specific topic of current interest to marine science is explored through discussion of the primary literature. One seminar meeting per week. Prerequisites: Biology Core or consent of instructor.
1 unit, Win (Thompson)

171H/271H. Ecological and Evolutionary Physiology—(Graduate students register for 272H.) The interplay between environmental factors (e.g., temperature, light, nutrient supply, salinity, and oxygen availability) and adaptive change at the physiological level. Emphasis is on marine species and the roles played by physiological adaptations in establishing their distribution and performance. Two lectures weekly. Prerequisites: Biology Core or consent of instructor.
4 units, Win (Somerlo)

174H/274H. Chance in Biology: Experimental Design and Probability—(Graduate students register for 274H.) Random behavior on the part of molecules, organisms, and the environment is an integral part of life. Introduction to the study of chance effects in a biological context. Topics: the use of statistics in the proper design and analysis of experiments and the use of probability theory to predict the effects of chance in diffusion, action potentials, chemotaxis, sight, hearing, and predator-prey interactions. Prerequisites: Biology Core or consent of instructor.
3 units, Spr (Denny, Watanabe)

175H. Problems in Marine Biology—Designed primarily to engage advanced undergraduates in research. Lectures, lab work, field studies, and individual problems. Prerequisites: junior or senior standing and consent of instructors.
12 units, Spr (Block, Denny, Epel, Gilly, Levine, Powers, Somero, Thompson, Watanabe)

198H. Directed Instruction/Reading—May be taken as a prelude to research and may also involve participation in a lab or research group seminar and/or library research. Credit for work arranged with out-of-department instructors restricted to Biological Sciences majors and requires department approval.
Aut, Win, Spr, Sum—both terms (Staff)

199H. Undergraduate Research—For experience in biological research, qualified undergraduate students may undertake individual work in the fields listed under 300H. Arrangements must be made by consultation or correspondence.
Aut, Win, Spr, Sum—both terms (Staff)

290H. Teaching of Biological Science—Open to upper-division undergraduates and graduate students. Practical experience in teaching lab biology or serving as an assistant in a lecture course. Prerequisite: consent of instructor.
1-5 units, Aut, Win, Spr, Sum (Staff)

300H. Research—Graduate study involving original work may be undertaken with members of the staff in the fields indicated:
B. Block: Comparative Vertebrate Physiology—biomechanics, metabolic physiology, and phylogeny of pelagic fishes, evolution of endothermy.
M. Denny: Biomechanics—the mechanical properties of biological materials and their consequences for animal size, shape, and performance.
W. Gilly: Neurobiology—analysis of giant axon systems in marine invertebrates from molecular to behavioral levels.
R. P. Levine: molecular biology and biochemistry of biomineralization.
D. Powers: Adaptational Biochemistry—molecular mechanisms of evolution, mechanisms of
gene expression in relation to environmental variables, molecular ecology, physiological ecology, population biology, biodiversity, and marine biotechnology.

G. Somero: Ecological and Evolutionary Physiology—adaptations of marine organisms to the environment: temperature, pressure, dessication, and oxygen availability.

S. Thompson: Neurophysiology—neuronal control of behavior and mechanisms of ion permeation, signal transduction, calcium homeostasis, and neurotransmission.

J. Watanabe: Marine Ecology—kelp forest ecology and invertebrate zoology.

SUMMER PROGRAM

The summer program is open to all advanced undergraduate, graduate, postdoctoral students, and teachers whose biological backgrounds, teaching, or research activities can benefit from a summer’s study of marine life. Application blanks and further information may be obtained by writing to Hopkins Marine Station, Pacific Grove, CA 93950. Completed applications should be submitted by March 31. Applications received later are considered if space is still available.

The Summer Quarter is divided into two terms. It is possible to register for either term, or for the full quarter. Registration is possible for only one course during each term.

FIRST TERM

179H. Subtidal Communities—Lectures, lab, and field trips treating shallow water marine communities. Emphasis is on local habitats and the introduction of physical environmental parameters, community composition, aspects of the biology of constituent species, and methods for subtidal studies. Prerequisites: SCUBA certification, SCUBA equipment, ocean diving experience, and some background in biology. 6 units (Watanabe)

238H. Biomechanics of Intertidal Organisms—Introduction to the mechanical design of wave-swept organisms, emphasizing the ecological implications of wave forces. The theories of water waves, fluid dynamics and solid mechanics; the design of materials, structures, whole organisms, and communities. Each student completes an individual research project. Recommended: background in invertebrate zoology, algology, or intertidal ecology; also basic physics and calculus. 5 units (Denny) alternate years, given 1998-99

SECOND TERM

180H/280H. Problems in Subtidal Ecology—(Graduate students register for 280H.) Group and individual research projects focus on shallow water marine communities, emphasizing the importance of identifying a relevant problem through review of the scientific literature, formulating an adequate research plan, and collecting data in the field. Lectures/discussions focus on proper experimental design, data analysis, and critiques of selected papers from the scientific literature. Prerequisites: 179H or consent of instructor; SCUBA certification, SCUBA equipment, and ocean diving experience. 6 units (Watanabe)

BIOPHYSICS PROGRAM

Professors: Richard W. Aldrich (Molecular and Cellular Physiology), Stephen Blacklow (Pathology), Steven Boxer (Chemistry), Art Boyer (Radiation Oncology), Martin J. Brown (Radiation Oncology), Gilbert Chu (Oncology), Steven Chu (Applied Physics), Sebastian Doniach (Applied Physics), Judith Frydman (Biological Sciences), Amato Giaccia (Radiation Oncology), Philip C. Hanawalt (Biological Sciences), David Heeger (Psychology), Daniel Herschlag (Biochemistry), Keith O. Hodgson (Chemistry), Wray H. Huestis (Chemistry), Peter Jackson (Pathology), Oleg Jardetzky (Molecular Pharmacology), Cordula Kirchgesnner (Radiation Oncology), Ron Kopito (Biological Sciences), Roger D. Kornberg (Structural Biology), Michael Levitt (Structural Biology), Chang Ma (Radiation Oncology), Harden M. McConnell (Chemistry), David B. McKay (Structural Biology), Robert Pecora (Chemistry), Norbert Pelc (Radiology), Paul Phizackerley (SSRL), Jody Puglisi (Biochemistry), Robert D. Simon (Biological Sciences), Ed Solomon (Chemistry), James A. Spudich (Biochemistry, and Developmental Biology), Lubert Stryer (Neurobiology), William Weis (Structural Biology)

The Biophysics Program offers instruction and research opportunities leading to the Ph.D. in Biophysics. Students admitted to the program may perform their graduate research in any appropriate department.

GRADUATE PROGRAM

A small number of highly qualified applicants are admitted to the program each year. Applicants should present strong undergraduate backgrounds in the physical sciences and mathematics. The graduate course program, beyond the stated requirements, is worked out for each student individually with the help of appropriate advisers from the Committee on Biophysics. The requirements and recommendations for the Ph.D. degree include:
1. Training in physics or chemistry equivalent to that of an undergraduate physics or chemistry major at Stanford.

2. Completion of the following courses (or their equivalents):
   a) Biophysics 250
   b) Biochemistry 200, 201
   c) Chemistry 131, 171, 173, and 175
   d) Additional courses as required for the individually tailored program.

3. Proficiency in one or more foreign languages and/or a computer language may be required at the discretion of the major professor.

4. Opportunities for teaching are available during the first nine quarters, at the discretion of the advising committee.

5. Passing a comprehensive qualifying examination in biophysics is required for admission to Ph.D. candidacy. This examination is normally taken in the second year of study, and it emphasizes the student's area of specialization in biophysics.

6. The student must prepare a Dissertation Proposal defining the research to be undertaken, including methods of procedure. This proposal should be submitted by Spring Quarter of the second year, and it must be approved by a committee of at least three members including the principal research adviser and at least one member from the Committee on Biophysics. The candidate must defend the dissertation proposal in an oral examination. The Dissertation Reading Committee normally evolves from the Dissertation Proposal Review Committee.

7. The student must present a Ph.D. dissertation as the result of independent investigation and expressing a contribution to knowledge in the field of biophysics.

8. The student must pass the University oral examination, taken only after the student has substantially completed the research. The examination is preceded by a public seminar in which the research is presented by the candidate.

COURSES

205. DNA Repair and Mutagenesis—(Enroll in Biology 205.)
   3 units, Spr (Hanawalt)

210. Advanced Topics in Membrane Biochemistry—(Enroll in Biochemistry 210.)
   4 units (Pfeffer) not given 1997-98

214. Physical and Chemical Principles of Biochemistry—(Enroll in Biochemistry 214.)
   4 units, Spr (Herschlag)

225. Molecular Motor Proteins and the Cytoskeleton—(Enroll in Biochemistry 225, Developmental Biology 225.)
   3 units (Spudich, Fuller)
   not given 1997-98

228. Protein and Nucleic Acid Structure, Dynamics, and Engineering—(Enroll in Structural Biology 228.)
   3 units, Win (Levitt)

232. Macromolecular Structure: Diffraction Methods and Diffraction Results—(Enroll in Structural Biology 232.)
   3 units, Win (Weis, McKay)

237. Introduction to Biotechnology—(Enroll in Biochemistry 237, Biological Sciences 237, Chemical Engineering 237, Civil and Environmental Engineering 237, Developmental Biology 237, Structural Biology 237.)
   3-5 units, Spr (Robertson)

250. Seminar in Biophysics—All graduate students in Biophysics must participate. Presentation of current research projects and results by all faculty in the Biophysics Program.
   1 unit, Aut, Win (Staff)

289. Biophysical Chemistry—(Enroll in Chemistry 289.)
   3 units (Staff) not given 1997-98

291. Biophysical Chemistry—(Enroll in Chemistry 291.)
   3 units, Win (McConnell)

   3 units (Solomon)
   alternate years, given 1998-99

300. Research
   (Staff)

Other biophysics courses in related departments:
Chemistry 251, Neurobiology 216.

Other recommended courses:
Biological Sciences 230, 252; Biochemistry 200; Chemistry 271, 273, 275; Physics 170, 171, 230, 231, Structural Biology 211.
THE CURRICULUM LEADING TO THE B.S. DEGREE IN CHEMICAL ENGINEERING IS DESCRIBED IN THE “SCHOOL OF ENGINEERING” SECTION OF THIS BULLETIN.
Math. (19, 20, 21 or 41, 42) and Physics (41, 43, 45, 47) prerequisites (no substitutions).

AMERICAN CHEMICAL SOCIETY CERTIFICATION

Students who wish to be certified as having met the minimum requirements of the American Chemical Society for professional training must complete, in addition to the above requirements, at least 6 units from Chemistry 136 and/or 190; and at least 3 additional units from one of the following: Chemistry 136, any chemistry course numbered above 200 for which permission to register had been granted by the instructor, Biochemistry 200, or an advanced course in mathematics or physics. A reading knowledge of German or Russian is strongly recommended.

HONORS PROGRAM

A limited number of undergraduates may be admitted to the Chemistry honors program at the beginning of the senior year. Those completing the program satisfactorily receive the B.S. degree in Chemistry with Honors.

Admission to the program requires a grade point average (GPA) of at least 3.0 in all course work in the University. In addition to the minimum requirements for the B.S. degree, the student must complete 9 units of Chemistry 190 to be taken 3 units per quarter for three quarters; and 9 additional units, including 3 units in chemistry, from Biochemistry 200, 214; Chemistry 221, 223, 225, 251, 253, 255, 271, 273, 275, 297; Math. 131, 132; Physics lecture courses numbered greater than 100; or other advanced courses approved by the department’s Undergraduate Study Committee. An overall GPA of 3.3 in all chemistry, mathematics, and physics course work including the above requirements, is required for a degree with honors.

Students who wish to be admitted to the honors program should register in the department undergraduate office in Mudd 283 at the beginning of the senior year. Those who do not meet all of the above formal requirements may petition the department for admission.

TEACHING CREDENTIALS

The requirements for certification to teach chemistry in the secondary schools of California may be ascertained by consulting the section on credentials under the "School of Education" section of this bulletin and the Credential Administrator of the School of Education.

GRADUATE PROGRAMS

GENERAL REQUIREMENTS

Qualifying examinations are given prior to the first week of the Autumn Quarter and in the first week of the Winter Quarter. Each new graduate student must take these examinations on entrance. Satisfactory performance is required for permission to begin dissertation research and to continue work for an advanced degree. Students on full-time fellowships may complete all requirements for the Ph.D. degree in nine quarters. Students on research or teaching assistantships may complete their requirements in fifteen quarters.

Candidates for advanced degrees must have a minimum grade point average (GPA) of 'B' for all chemistry lecture courses as well as for all courses taken during graduate study. Required courses may not be taken with the Satisfactory/No Credit option. All students are expected to give full time to graduate work once they have begun dissertation research. All prospective Ph.D. candidates, regardless of the source of financial support, are required to gain teaching experience as an integral part of graduate training. During the period in which a dissertation is being read by members of the faculty, candidates must be available for personal consultation until the dissertation has had final department approval. In addition to department requirements, candidates for advanced degrees must meet the general University regulations as stated in the “Graduate Degrees” section of this bulletin.

QUALIFYING EXAMINATIONS

These examinations consist of three written exams of two hours each in the fields of inorganic, organic, and physical chemistry, and cover such material as ordinarily is given in a rigorous one-year undergraduate course in each of these subjects. Students majoring in biophysical chemistry must pass examinations in biophysical and physical chemistry, and either organic or inorganic chemistry. Students who fail to pass these examinations in the Autumn Quarter are required to repeat them during the first week of the Winter Quarter. All qualifying examinations are given September 18, 19, and 20, 1997, and must be taken at that time.

MASTER OF SCIENCE

Applicants for the M.S. degree in Chemistry are required to complete, in addition to the requirements for the bachelor’s degree, a minimum of 36 units of work and an M.S. thesis. Of the 36 units, approximately two-thirds must be in the department and must include at least 12 units of advanced course work in chemistry exclusive of the thesis. Of the 12 units, at least 3 units must be from Chemistry 221, 223, 225, 251, 253, 255, 271, 273, 275, or 297.

MASTER OF ARTS IN TEACHING (CHEMISTRY)

In cooperation with the School of Education, the department offers a program leading to the Master of Arts in Teaching (Chemistry). This
degree is for candidates who have a teaching credential and wish to strengthen further their academic preparation. The program consists of a minimum of 25 units in the teaching field and 12 units in the School of Education. Detailed requirements are outlined under the School of Education, Master of Arts in Teaching section of this bulletin. Not offered 1997-98.

**DOCTOR OF PHILOSOPHY**

Graduate students are eligible to become formal candidates for the Ph.D. degree after passing the department qualifying examinations, satisfactorily completing most of the formal lecture course requirements, and beginning satisfactory progress on a dissertation research project. They then file for admission to candidacy for the Ph.D. degree. This filing must be done before June of the second year of graduate registration.

After passing the departmental qualifying examinations, students select research advisers by first interviewing at least ten members of the Chemistry faculty about their research. Students then file an Application to Start Research form with the Department of Chemistry Graduate Study Committee and begin research on their Ph.D. dissertation under the supervision of an adviser. All students in good standing are required to start research by the end of the Winter Quarter of the first year of graduate registration.

The foreign language requirement for the Ph.D. in organic chemistry must be met with German. The foreign language requirement in physical, biophysical, or inorganic chemistry may be met with French, Japanese, German, or Russian. The requirement may be met by completing one year (two semesters or three quarters) of the given language at the college level, by receiving a passing grade in a college-level intensive reading course (for example, German 10, French 50), or by successfully completing a reading test in the language given by the Department of Chemistry.

Candidates for the Ph.D. degree are required to participate continually in the department seminar (Chemistry 300), and in the division seminar of the major subject. In addition, continuous enrollment in Chemistry 301 is expected after the student has passed the qualifying examinations and chosen a research supervisor. As part of graduate training, Ph.D. candidates are required to gain experience as teaching assistants.

Before candidates may request scheduling of the University oral examination, clearance must be obtained from the major professor and the chair of the department’s Graduate Study Committee. Conditions that must be fulfilled before clearance is granted vary with the different divisions of the department and may be ascertained by consulting the chair of the committee.

It is the policy of the department to encourage and support in every possible way the pursuit of research and other advanced work by qualified students. Information about staff members with lists of their recent research publications is found in *Chemistry at Stanford 1997-98* and the Directory of Graduate Research published by the American Chemical Society.

**COURSE REQUIREMENTS**

Students may major in inorganic, organic, physical, or biophysical chemistry. All graduate students are required to take six graduate-level courses (course numbers greater than 199) of at least 3 units each in chemistry or related disciplines (for example, biochemistry, electrical engineering, mathematics, pharmacology, physics, and so on), to be selected in consultation with their research adviser and the Graduate Study Committee. At least four of these courses should be taken in the first year. In addition, students majoring in Organic Chemistry must take 3 units in Chemistry 233 in the second and third year. Required courses must be taken for a letter grade.

**CHEMICAL PHYSICS**

Students with an exceptionally strong background in physics and mathematics may, upon special arrangement, pursue a program of studies in chemical physics.

**Ph.D. MINOR**

Candidates for the Ph.D. degree in other departments who wish to obtain a minor in chemistry must complete, with a GPA of 'B' or better, 20 graduate-level units in chemistry.

**FELLOWSHIPS AND SCHOLARSHIPS**

In addition to school fellowships and scholarships open to properly qualified students, there are several department fellowships in chemistry. Undergraduate scholarships are administered through the Financial Aid Office. Teaching assistantships and research assistantships are open to graduate students. Graduate fellowships, scholarships, and teaching assistantships are administered through the Department of Chemistry.

**COURSES**

(WIM) indicates that the course meets the Writing in the Major requirements.

*Note—Lab fees, against which charges are made for breakage, are a minimum of $35 per quarter. Students taking courses with an * must preregister in the Department of Chemistry.*

**UNDERGRADUATE**

21N. Stanford Introductory Seminar: On Understanding Science—The Tactics and Strategies of Science—Preference to freshmen. For students not going into science; future scientists
may find the discussion of use and interest. Taken from a book by James B. Conant. What is the scientific method, how does it work, what can it do, what is not designed for from the point of view of practicing scientists. Three case histories of scientific development. Other readings on the scientific method, and the history and philosophy of science. Recommended: high school chemistry or physics.

2 units, Spr (Ross)

22N. Stanford Introductory Seminar: The Frontiers of Science—Preference to freshmen. Materials from readings on research breakthroughs, research seminars, and Ph.D. oral examinations campus-wide are integrated in discussions on the nature of modern research. Prerequisite: 32 or equivalent.

2 units, Win (Collman)


2 units, Win (Djerassi)

30. Introduction to Chemistry—Preparation for 31. For students with limited background in chemistry and mathematics. Introduction to chemical principles: moles, valence, stoichiometry, definitions, problem solving, quantitative skills.

3 units, Aut (Rennagel)

*31. Chemical Principles—For students with substantial chemistry background. Preparation for chemistry, chemical engineering, medicine, biochemistry, biology, and related fields. Atomic and molecular orbital theory, periodicity, bonding properties of matter, stoichiometry. Recitation. Prerequisite: high school algebra. Recommended: high school chemistry and physics. GER:2a (DR:5)

4 units, Aut (Boxer)
  Win (Waymouth)
  Sum (Staff)

*32. The Frontiers of Chemical Science—For students with AP Chemistry scores of 4 or 5 who wish to develop a deeper understanding. Complements a previous rigorous introduction to chemistry; encompasses structure and reactivity, and cuts across the traditional subdivisions of chemistry. Recent advances in structures, analytical methodologies, catalysis, redox phenomena, organometallic, and bio-inorganic chemistry. Lab and recitation. GER:2a (DR:5)

5 units, Aut (Collman, Zare)

*33. Structure and Reactivity—Organic chemistry, functional groups, hydrocarbons, stereochemistry, thermochemistry, kinetics, chemical equilibria. Recitation. Prerequisite: 31, 32, or an AP Chemistry score of 4 or 5. GER:2a (DR:5)

4 units, Win (Collman, Wandless)
  Spr (Wender)
  Sum (Staff)

*35. Organic Monofunctional Compounds—Organic chemistry of oxygen and nitrogen aliphatic compounds. Recitation. Prerequisite: 33.

4 units, Aut, Sum (Flygare, Staff)
  Spr (Huestis, Flygare)

*36. Chemical Separations—Techniques for separations of compounds; distillation, crystallization, extraction, and various chromatographic procedures. Lecture treats the theory; lab provides practice. Prerequisites: 33 and concurrent or previous enrollment in 35.

3 units, Spr, Sum (Touster, Staff)

10. Directed Instruction/Reading—Undergraduates pursue a reading program under supervision of a faculty member in Chemistry; may also involve participation in lab. Prerequisites: superior work in 31 or 32, and 33; approval of the instructor and of the Chemistry Undergraduate Study Committee.

1-2 units (Staff)


4 units, Aut (Touster)

*131. Organic Polyfunctional Compounds—Aromatic compounds, polysaccharides, amino acids, proteins, natural products, dyes, purines, pyrimidines, nucleic acids, and polymers. Prerequisite: 35.

3 units, Aut, Win (Huestus, Touster)

*132. Qualitative Organic Analysis—Required of and limited to chemistry majors; others may be admitted with consent of instructor. Separation of mixtures of organic compounds and identification of the components using rational synthesis and analysis of spectral data. Lab. Prerequisites: 35, 36, and concurrent registration in 131.

5 units, Aut (Touster)


3 units, Win (Smith, Goldstein)

*134. Theory and Practice of Quantitative Chemistry—Theory and practice of quantitative analysis. Methods include gravimetric, volumetric, spectrophotometric, and electrometric. Lab. Prerequisite: 130 or 132. (WIM)

5 units, Win (McMills)
135. Physical Chemical Principles—Terminal physical chemistry for non-chemistry majors. Emphasis on portions of physical chemistry most useful for students of the life sciences. Introduction to chemical thermodynamics, heterogeneous equilibria, thermodynamics of solutions, electrolytes, chemical kinetics, macromolecular solutions, and colloidal dispersions. Prerequisites: 31, calculus.
3 units, Win (Pecora)

Synthesis Laboratory—Advanced synthetic methods in organic and inorganic laboratory chemistry. Prerequisites: 130 or 132, 131.
3 units, Spr (Touster)

Inorganic Chemistry I—Systematic introduction to theories of electronic structure, stereochemistry, and symmetry properties of inorganic and organometallic molecules. Topics: ionic and covalent interactions, electron-deficient bonding, and elementary ligand field and molecular orbital theories. Emphasis is on the chemistry of the metallic elements. Prerequisites: 35, 171.
3 units, Win (Hodgson)

Inorganic Chemistry II—Systematic presentation of the theoretical aspects of inorganic chemistry. Group theory; many electron atomic theory; molecular orbital theory, emphasizing general concepts and group theory; ligand field theory; application of physical methods to predict the geometry, magnetism, and electronic spectra of transition metal complexes; and theoretical aspects of electron transfer reactions. Prerequisites: 151, 173.
3 units, Spr (Mcmills)

Physical Chemistry—Chemical thermodynamics; fundamental principles, Gibb'sian equations, equilibrium conditions, phase rule, systematic deduction of equations, gases, solutions. Prerequisites: 35; Math. 41, 42; Physics 41, 43, 45; and previous or concurrent registration in Physics 47.
3 units, Aut (Pecora)

Physical Chemistry—Introduction to quantum chemistry: basic principles of wave mechanics, the harmonic oscillator, the rigid rotator, infrared and microwave spectroscopy, the hydrogen atom, atomic structure, molecular structure, valence theory.
3 units, Win (Fayer)

Physical Chemistry Laboratory—Thermodynamics, transport, and rotation-vibration spectroscopy. Experimental techniques include electronics, potentiometry, amperometry, calorimetry, and Fourier-transform infrared spectroscopy. Lab tours and supporting lectures on experimental techniques used in research projects at Stanford. Lab. Prerequisites: 134, 171, previous or concurrent enrollment in 173; Math 53, 103 or 113; and Physics 45, 46. Recommended: Physics 47.
4 units, Win (Chidsey)

3 units, Spr (Ross)

Synthesis Laboratory—Use of chemical instrumentation to study fundamental areas of physical chemical time-dependent processes. Experiments include reaction kinetics, fluorimetry, and nuclear magnetic and electron spin resonance spectroscopy. Lab. Prerequisites: 173, 174, previous or concurrent enrollment in 175.
3 units, Spr (Dai)

Graduate

Undergraduates may register for chemistry courses numbered above 200 only if admitted to the honors program or if special permission has been granted by the instructor.

3 units, Aut (Brauman)

Classics in Hydrocarbon Synthesis—Various approaches and strategies to synthesizing important hydrocarbons are compared for relative merit, significance, and elegance. Prerequisite: 133.
3 units, Aut (Hopf)

Advanced Organic Chemistry—Continuation of 221 with emphasis on physical methods. Prerequisite: 221 or consent of instructor.
3 units, Win (Wandless)

Advanced Organic Chemistry—Continuation of 223. Organic reactions, new synthetic methods, conformational analysis, and exercises in the synthesis of complex molecules. Prerequisite: 223 or consent of instructor.
3 units, Spr (Wender)

Selected Topics in Organic Chemistry—May be repeated for credit. Possible topics: synthetic organic chemistry, photochemistry, inorganic-organic chemistry, bio-organic chemistry, reaction mechanisms, stereochemistry, structural chemistry of organic and biological molecules.
3 units (Staff)

Organic Chemistry Seminar—Attendance required of all graduate students majoring in organic chemistry. Students giving seminars register for 231.
1 unit, Aut, Win, Spr (Brauman)
23. Creativity in Organic Chemistry—Required of all second- and third-year Ph.D. candidates in organic chemistry. The art of formulating, writing, and orally defending a research progress report is practiced and criticized, with the student using his own research as a vehicle.

1 unit, Aut, Win, Spr (Brauman)

235. Applications of NMR Spectroscopy—Uses of NMR spectroscopy in chemical and biochemical sciences emphasizing data acquisition for liquid samples and including selection, setup, and processing of standard and advanced experiments.

3 units, Win (Keifer)

251. Selected Topics in Advanced Inorganic Chemistry—May be repeated for credit. Prerequisites: one year of physical chemistry, consent of instructor.

3 units (Staff) not given 1997-98

253. Advanced Physical Inorganic Chemistry—Electronic structure and physical properties of transition metal complexes. Ligand field and molecular orbital theories, magnetism and magnetic susceptibility, electron paramagnetic resonance (including hyperfine interactions and zero field splitting) and electronic absorption spectroscopy (including vibrational interactions). Prerequisite: 153 or the equivalent.

3 units (Solomon)
alternate years, not given 1998-99


3 units, Spr (Waymouth)

256. Synthetic Bio-Inorganic Chemistry—Topics in classical coordination chemistry applicable to metal sites in biological systems. Emphasis on use and design of simple synthetic coordination complexes to probe the unique structural and reactivity properties of metals in biological systems. Prerequisite: 153.

3 units, Spr (Stack)

257. Research Proposals in Inorganic Chemistry—May be required of second-year students in inorganic chemistry at the discretion of the research adviser. Research progress reports and research proposals are presented in oral and written form. Writing ability, oral defense, and scientific content is criticized.

1 unit, Aut, Win, Spr (Staff)

259. Inorganic Chemistry Seminar—Attendance required of all graduate students majoring in inorganic chemistry.

1 unit, Aut, Win, Spr (Staff)

271. Advanced Physical Chemistry—Principles of quantum mechanics. General formulation, mathematical methods, and elementary applications of quantum theory to the structure of atoms and molecules, including variational procedures, perturbation theory, operator and matrix methods, theory of angular momentum, and elements of the electronic structure of atoms. Prerequisite: 175.

3 units, Aut (Fayer)

273. Advanced Physical Chemistry—Topics in advanced quantum mechanics: vibrations and rotations of polyatomic molecules (normal modes, anharmonicity, wavefunctions and energy levels of rigid rotations, vibration-rotation interaction), ab initio electronic structure theory (Hartree-Fock, configuration interaction, multiconfiguration self-consistent-field, and many-body perturbation theory techniques), angular momentum theory (operators and wavefunctions, Clebsch-Gordan coefficients, rotation matrices), time-dependent quantum mechanics (time evolution operator, Feynman path integrals, scattering theory, Born approximation, Lipmann-Schwinger equation, correlation functions), interaction of radiation and matter (semiclassical and quantum theories of radiation, transition probabilities, selection rules). Prerequisite: 271 or Physics 230.

3 units, Win (Dai)

275. Advanced Physical Chemistry—Basic principles and methods of statistical mechanics from the ensemble point of view, statistical thermodynamics, heat capacities of solids and polyatomic gases, chemical equilibria, equations of state of fluids, phase transitions. Prerequisite: 271.

3 units, Spr (Chidsey)

277. Selected Topics in Physical Chemistry—Possible topics: structure elucidation using diffraction techniques, advanced statistical mechanics, crystal field theory, advanced quantum mechanics, magnetic relaxation, advanced thermodynamics, chemical applications of group theory. May be repeated for credit. Prerequisite: 275 or consent of instructor.

3 units (Staff)

279. Physical Chemistry Seminar—Required of all graduate students majoring in physical chemistry.

1 unit, Aut, Win, Spr (Staff)

283. Research Proposals in Physical Chemistry—May be required of 2nd- and 3rd-year graduate students at the discretion of the research adviser. Students present research proposals and progress reports on their research in physical chemistry, using oral and written forms. Topics may be drawn
from the student's research of a related area in physical chemistry. Written form, oral presentation, and scientific merit are evaluated.

1 unit, Aut, Win, Spr (Staff)

287. Biophysical Chemistry—The theoretical and experimental aspects of biophysical phenomena emphasizing membrane biophysics and membrane biology. Prerequisites: previous or concurrent registration in 171 and 173, or the equivalent.

3 units (Staff) not given 1997-98

289. Biophysical Chemistry—Experimental methods in biophysics. Emphasis on spectroscopic techniques including magnetic resonance and optical methods. Prerequisite: 287.

3 units (Staff) not given 1997-98

291. Biophysical Chemistry—Special topics in biophysical chemistry. Prerequisites: previous or concurrent registration in 171 and 173, or the equivalent.

3 units, Win (McConnell)

293. Structural Inorganic Chemistry—Structural biophysical chemistry, x-ray crystallography, and related techniques as used in biophysical research. Electron and optical microscopy and neutron diffraction. Prerequisite: 291 or consent of instructor.

3 units (Staff) not given 1997-98

297. Bio-Inorganic Chemistry—Overview of metal sites in biology. Metalloproteins as elaborated inorganic complexes, their basic coordination chemistry and bonding, unique features of the protein ligand, and physical methods used to study active sites. Active site structures correlated with function. Prerequisites: 153 and 173, or equivalents.

3 units (Solomon)

alternate years, given 1998-99

299. Teaching of Chemistry—Required of all teaching assistants in chemistry. Techniques of teaching chemistry by means of lectures and labs.

1-3 units, Aut, Win, Spr (Staff)

300. Department Colloquium—Required of all graduate students.

1 unit, Aut, Win, Spr (Staff)

301. Research in Chemistry—Required of all graduate students who have passed the qualifying examination. Open to qualified graduate students with the consent of the major professor. Research seminars and directed reading dealing with newly developing areas in chemistry and experimental techniques. May be repeated for credit. Students register giving section number of staff member and number of units agreed upon.

2 units, Aut, Win Spr (Staff)

RESEARCH AND SPECIAL ADVANCED WORK

190. Introduction to Methods of Investigation—Limited to undergraduate students admitted under the honors program or by special arrangement with a member of the teaching staff. For general character and scope, see 200. Corequisite: 300, (Staff)

200. Research and Special Advanced Work—Properly qualified graduate students are encouraged to undertake research, or advanced lab work not covered by listed courses, under the direction of a member of the teaching staff. For research and special work, students register for 200 (190, if undergraduate), giving section number of staff member under whom work is carried on and number of units agreed upon. (Staff)

CHILDREN AND SOCIETY CURRICULUM

Director: William Damon
Assistant Director: Christina Johannes
Affiliated Faculty: John Baugh (Education), David W. Brady (Political Science, Hoover Institution), Harvey J. Cohen (Pediatrics), Phyllis Denney, (Pediatrics), Sanford M. Dornbusch (Sociology, Human Biology, Education, emeritus), Alain Enthoven (Business), S. Shirley Feldman (Psychiatry, Human Biology), Victor R. Fuchs (Economics, emeritus), Christopher Hayward (Psychiatry and Behavioral Sciences), Margo Horn (History), Donald Kennedy (Biological Sciences), Michael W. Kirst (Education), Eleanor E. Maccoby (Psychology, emerita), Joseph D. McNamara (Hoover Institution), Terry M. Moe (Political Science, Hoover Institution), Roger G. Noll (Economics, Public Policy), Amado M. Padilla (Education), Donald F. Roberts (Communication), Timothy K. Stanton (Haas Center for Public Service, Public Policy), David B. Tyack (Education, History), Michael S. Wald (Law).

The curriculum on Children and Society is under the auspices of the Stanford Center on Adolescence and the School of Humanities and Sciences.

UNDERGRADUATE STUDY

The curriculum on Children and Society focuses on the study of children and society from diverse points of view including biological, cross-cultural, developmental, economic, historical, and legal perspectives. Emphasis is on public policy, and the curriculum is intended to serve students who plan to pursue careers in law, government, education, medicine, social sciences, and social services. The curriculum includes research and field experiences with organizations that serve children and youth and form public policy. The goal is to
sensitize students to the problems of children in today’s society. Issues are addressed on various levels, from the family to the nation.

The curriculum on Children and Society does not in itself constitute a major. Students major in another department or program such as American Studies, Anthropology, Economics, History, Human Biology, Political Science, Psychology, Public Policy, Sociology, or Urban Studies. Students who fulfill curriculum requirements receive a certificate, authorized by the academic senate, upon graduation. These requirements are:

1. Human Biology 126
2. One of five policy courses: Education 105; History 273A; or Public Policy 101, 104, or 182
3. A research experience to be met in one of seven ways:
   a) Education 179X
   b) Human Biology 127A and B
   c) Psychology 111
   d) Individual research work supervised by a faculty member
   e) A group research project
   f) An honors thesis
   g) A methodical, supervised evaluation of recently completed community service work with children, youth, or families. The evaluation should assess the quality of the outreach experience and the utility of the activity
4. A policy-related internship
   Interested students should contact the curriculum at (650) 725-2521.

COURSES

See the respective department listings for course descriptions and General Education Requirements (GER) information.

EDUCATION

105. American Education and Public Policy—(Same as History 158B.)
   4 units, Aut (Kirst, Tyack)

179X. Urban Youth and their Institutions: Research and Practice
   3 units, not given 1997-98

HISTORY

273A. Undergraduate Colloquium: Childhood in Modern American History—(Same as 373A.)
   5 units, Spr (Horn)

HUMAN BIOLOGY

   4 units, Aut (S. Feldman)

127A,B. Research Seminar on Adolescence
   127A. 3 units, Aut (Feldman, Cauffman)
   127B. 3 units, Win (Feldman, Cauffman)

PSYCHOLOGY

111. Research Methods in Developmental Psychology
   4 units (A. Fernald, Flavell, Markman) not given 1997-98

PUBLIC POLICY

101. Politics and Public Policy—(Same as Political Science 101P.)
   5 units, Spr (Weingast)

104. Economics and Public Policy
   5 units, Win (Noll)

182. Policy Making and Problem-Solving at the Local and Regional Level
   4 units, Spr (Stanton)

AFFILIATED DEPARTMENT OFFERINGS

The following courses are related to children and public policy. They do not count toward curriculum certification.

ECONOMICS

116. American Economic History
   (Wright)

147. Economics of Human Resources
   not given 1997-98

148. Urban Economics
   not given 1997-98

156. Economics of Health and Medical Care
   (McClellan)

EDUCATION

201. History of Education in the United States—(Same as History 158.)
   (Tyack)

210. Problems in Sociology of Education—(Same as Sociology 232/330.)
   (Cohen)

220A. The Social Sciences and Educational Analysis: Introduction to the Economics of Education
   (Strober)

221. Issues in Policy Analysis
   (Kirst)

239. Contemporary Social Issues in Child and Adolescent Development
   (Padilla) not given 1997-98
HUMAN BIOLOGY
3B. Cell Biology and Developmental Biology: The Human Life Cycle
(A. Fernald, Katchadourian)

POLITICAL SCIENCE
186. Urban Politics
(Fraga)

PSYCHOLOGY
60. Introduction to Developmental Psychology
(Flavell)
141. Cognitive Development
(Markman)
142. Social Development
(M. Lepper)

SOCIOLOGY
130. Education and Society
(Meyer)

CLASSICS
Emeriti: (Professors) Mark W. Edwards, Michael H. Jameson, Antony E. Raubitschek
Chair: Ian Morris
Graduate Director: Andrea Nightingale
Undergraduate Director: J. G. Manning
Professors: Andrew M. Devine, Marsh H. McCall, Jr., Ian Morris (Classics and History), Susan A. Stephens, Susan Treggiari (Classics and, by courtesy, History)
Associate Professors: Jody Maxmin (Art History and Classics), Andrea W. Nightingale, Michael Wigodsky
Assistant Professors: W. Martin Bloomer, J. G. Manning, Yasmin Syed
Professor (Teaching): Robert C. Gregg (Classics and Religious Studies)
Courtesy Professors: George Brown (English), Valentin Y. Mudimbe (French and Comparative Literature)
Courtesy Associate Professor: Maurice Rehm (Drama)
Lecturers: Honora Chapman, Maud Gleason, Patrick Hunt
Visiting Professors: Gian B. Conte (Spring), Charles Hedrick (Autumn), James Redfield (Winter), Charles Segal (Winter)
Visiting Assistant Professor: Hilary Mackie

UNDERGRADUATE PROGRAMS
The Department of Classics offers courses on all aspects of Greek and Roman culture: language, literature, history, art and archaeology, philosophy, and cultural studies. The department offers four majors in Classics (Classical Studies, Greek, Latin, and Greek and Latin) which vary in the number of language courses they require; each of these majors can be completed in conjunction with a second major in the sciences or in other humanities departments.

The major in Classics affords an opportunity to develop a competence in the classical languages; an appreciation, comprehension, and enjoyment of classical literature; and an understanding of the history and culture of the ancient world. The department is interested in students who wish to do their major work in Classics and in students who wish to relate work in Classics to work in other departments.

BACHELOR OF ARTS
Prospective majors in Classical Studies, Greek, and Latin (options 1, 2, and 3) are encouraged to declare at the beginning of the junior year but are urged to discuss their plans with the Undergraduate Director as early as possible. Students who choose to major in Greek and Latin (option 4) should begin the curriculum as soon as possible, since it is difficult to complete the language requirements without an early start; those with no previous knowledge of Latin or Greek should begin study in the freshman year or as early as possible in the sophomore year.

To declare the major, a student must fill out the Declaration of Major form in the Registrar’s Office and meet with the Undergraduate Director in the Department of Classics. At that time, the Undergraduate Director assigns each student a department adviser who helps to prepare a program of study; students should meet with their advisers at least once a quarter. Each student’s progress towards fulfillment of the major requirements is recorded in a file kept in the main office. It is the student’s responsibility to work with his or her adviser in keeping this file up to date.

The A.B. degree may be earned by fulfilling the requirements for one of the four following majors:

1. Classical Studies: at least 55 units, including at least two courses in Latin or Greek at the 100 level or higher or one course in one of the languages at the 100 level or higher plus the 1, 2, 3 or 51, 52 series in the other language (or an equivalent approved by the department). In addition, students are required to take the Majors Seminar (176) and at least one course in each of the following five groups: ancient history, art and archaeology, literature in translation, philosophy, religion and mythology. Students are also encouraged to do some of the course of study in Greece or Rome (programs and funding are described below).

This major is recommended for students who wish to study the classical civilizations in depth but do not wish to study the languages to the
extreme value for students who wish to do graduate work in Classics or to teach Latin or Greek in high school, as the language work is insufficient for these purposes.

2. Greek: at least 55 units, including a minimum of 31 units in Greek courses at the 100 level or higher (it is recommended that one of these courses be Greek 175A, although this course should not be attempted until students have completed three years of Greek). In addition to courses in Greek, students are required to take the Majors Seminar (176) and at least one course in each of the following three groups: history/archaeology, literature in translation, and religion/philosophy. The introductory sequence (1, 2, 3) or 51, 52 or one 100-level course in Latin is recommended. Beginning courses in Greek, if required, may be counted towards the total of 55 units. Relevant courses in other departments of the humanities may count towards the major with the consent of the Undergraduate Director. Students are strongly encouraged to do some course of study in Greece (programs and funding are described below).

3. Latin: at least 55 units, including a minimum of 31 units in Latin courses at the 100 level or higher (it is recommended that one of these courses be Latin 175A, although this course should not be attempted until students have completed three years of Latin). In addition to courses in Latin, students are required to take the Majors Seminar (Classics 176) and at least one course in each of the following three groups: history/archaeology, literature in translation, and religion/philosophy. The introductory sequence (1, 2, 3) or 51, 52 or one 100-level course in Greek is recommended. Beginning courses in Latin, if required, may be counted towards the total of 55 units. Relevant courses in other departments of the humanities may count towards the major with the consent of the Undergraduate Director. Students are strongly encouraged to do some course of study in Rome (programs and funding are described below).

4. Greek and Latin: at least 60 units, including 27 units in Greek courses and the same number in Latin. It is recommended that students take Greek 175A or Latin 175A (or both), although these courses should not be attempted until students have completed three years of the respective language. All students are required to take the Majors Seminar (Classics 176); it is strongly recommended that students take a course in ancient history. Relevant courses in other departments of the humanities may count towards the major with the consent of the Undergraduate Director. Students are also encouraged to do some of the course of study in Greece or Rome (programs and funding are described below).

Note 1—University credit earned by placement tests or advanced placement work in secondary school is not counted towards any major program in the department; work done in other universities or colleges is subject to department evaluation.

Note 2—A letter grade is required in all courses taken for the major. No course receiving a grade point average (GPA) lower than 'C' is counted toward fulfilling major requirements.

MINORS

The Undergraduate Director meets with each student who opts for a minor to discuss his/her chosen curriculum and assigns the student an adviser in the relevant field. Students are required to work closely with their advisers to create a cohesive curriculum within each area. Students may organize their curriculum according to different principles: for example, they may wish to focus on a specific historical period (Classical Athens, Imperial Rome), or on a specific theme or topic (women in antiquity). After consulting with the adviser, each student must submit (in writing) a "Proposed Curriculum" to the Undergraduate Director. Students may proceed with the minor when the director has approved the proposal. Courses offered in Greek and Latin above the 100 level may count towards the minor, provided the subject matter is suitable.

Students may choose between three minors in Classics:

1. Classical Languages: students are required to take a minimum of five courses in Greek or in Latin plus the majors seminar. Students wishing to combine Greek and Latin may only do so if courses for one of the two languages are all above the 100 level; for example, Greek 51, 52 plus Latin 103, 111, 175.

2. History: students are required to take a minimum of five courses in history, art history, and archaeology. Courses offered in Latin and Greek that focus on historical topics or authors may count towards the minor.

3. Literature and Philosophy: students are required to take a minimum of five courses in Classical Literature or Philosophy. Courses offered in Latin and Greek that focus on philosophical or literary topics or authors may count towards the minor.

All students minoring in Classics are required to take the major's seminar, Interpreting Antiquity, which is writing intensive.

HONORS PROGRAMS

A minimum GPA of 'B+' in Classics courses is required for students to enroll in the honors program. To be considered for honors in Classics, the student must select a professor who can supervise his or her honors thesis. Together with the
supervisor, the student writes a two- to three-page proposal at the beginning of the senior year. The proposal should outline the project in detail, list relevant courses that have been taken, and name the supervisor. The department gives approval only if it is satisfied that the student has a sufficient basis of knowledge derived from department course work in the general areas the thesis covers (that is, course work in art, Greek and/or Latin, language, history, literature, philosophy, and so on). If the proposal is approved, the student may sign up for Classical Studies 199 during one or two quarters of the senior year for a maximum of 6 units a term, up to an overall total of 10 units. Honors are awarded only if the essay receives a GPA of ‘B+’ or higher from the supervisor and a second reader.

HUMANITIES

For majors in Classics with appropriate interests, the honors program in Humanities is available, a description of which is found under the “Humanities Special Programs” section of this bulletin.

OVERSEAS STUDIES

Funding—Students whose record in Classics indicates that they are fully qualified for a given program may apply for funding from the Department of Classics. Students must submit a proposal to the Undergraduate Adviser, which should include an itemized list of expenses based on the fees charged by the program (that is, room, board, tuition, and other expenses). Limited funding is available each year; preference is shown to students with strong records.

Programs—

1. Rome: Classics majors are encouraged to apply for the Intercollegiate Center for Classical Studies (ICCS) in Rome. The center is managed by Duke University for about 50 constituent colleges and universities. It is open to Stanford majors in Classics, History, and Art History. All courses receive full credit at Stanford and may be applied to the respective major. Students interested in this program should consult the Undergraduate Director and the ICCS representative in the Department of Classics as early as possible in their career at Stanford to plan their course preparation and application. Applicants should note that competition is strong and that they are expected to have taken one or more courses in Roman history and at least two years of Latin before they arrive in Rome. Brochures are available at the department office.

   Other programs offer a quarter, semester, or summer session in Rome. Interested students are urged to visit Bechtel International Center.

2. Greece: students are encouraged to apply for the summer session at the American School of Classical Studies in Athens. The school is recommended principally for Classics majors with at least two years of ancient Greek. Students wishing to apply should prepare themselves by taking courses in Greek history, archaeology, and art; Beginning Modern Greek is strongly recommended. Applicants should see the Undergraduate Director early in the academic year. Other programs offer a quarter, semester, or summer session in Greece. Interested students are urged to visit Bechtel International Center.

GRADUATE PROGRAMS

MASTER OF ARTS

Students who have completed an undergraduate major in Classics (Greek and/or Latin) or its equivalent may be accepted as candidates for the A.M. degree in Classics or A.M. in Classics in the field of Greek or Latin, and may expect to complete the program in twelve months (usually three quarters of course work plus three months study for the thesis or examination). Students without an undergraduate major in Classics may also be accepted as candidates, though they may require a longer period of study before completing the requirements for the degree. These requirements are:

1. Attaining a standard of scholarship such as would normally be reached by three quarters of study in the department after fulfilling the requirements for an undergraduate major in the department. Normally, this means completing at least 18 units of graduate courses and 18 units of work at the 140 level or above.

2. Satisfactory completion of one Greek course at the 100 level (if the undergraduate major has been Latin) or one Latin course at the 100 level (if the undergraduate major has been Greek).

3. Passing an examination testing the candidate’s ability to translate into English from a selected list of Greek and/or Latin authors.

4. Satisfactory completion of the 275A, B sequence in at least one language (Latin or Greek).

5. Writing a thesis, or passing of an examination on a particular author or topic, or written work accepted by the graduate committee as an equivalent. Three completed and satisfactory seminar papers are normally an acceptable equivalent.

6. Reading knowledge of French or German.

7. Completion of a Program Proposal for a Master’s Degree form in the first quarter of enrollment.

Candidates for the Ph.D. degree may also (on the recommendation of the department) become candidates for the A.M. degree. In their case, requirement 5 above is waived provided that they
have completed some work beyond the course requirements listed under requirements 1 and 2 above.

DOCTOR OF PHILOSOPHY

University requirements for the Ph.D. are discussed in the "Graduate Degrees" section of this bulletin.

All candidates for the Ph.D. degree in Classics must fulfill the following requirements:

1. Completing at least three years (nine quarters) of full-time work, or equivalent, in study beyond the bachelor's degree. This must include the 175-205 sequence and the 202-203 sequence (unless the student is exempted by examination) and normally at least twelve graduate seminars acceptable to the department, in addition to the doctoral dissertation. At least three consecutive quarters of graduate work and the final units of credit in the program must be taken at Stanford. More detailed information on the Ph.D. program is available in brochure form in the Department of Classics office.

2. Candidates are required to pass examinations as follows:
   a) Reading examinations in French and German. In some circumstances Italian may be substituted for French. Students should plan to satisfy this requirement as soon as possible, normally no later than the end of the second year.
   b) Translation examinations into English from a prepared set of Greek and Latin authors and at sight. These examinations must be taken at the end of the first year and at the end of the second year as part of the requirement for the 202-203 sequence.
   c) General examinations in four of the following fields: Greek literature, Latin literature, ancient philosophy, Greek history, Roman history. At least one field must be historical and another must be literary. Students select the fields in consultation with the Graduate Director no later than June of the second year of graduate study. Three of the fields are tested by written examination combined with a supplemental general oral examination. General examinations must be taken in October of the third year.
   d) The University oral examination on the candidate's dissertation.
   The examinations in translation from Greek and Latin authors must be taken at the end of the first and at the end of the second year of graduate work, the general written and oral examinations in October of the third year, and the University oral examination at the end of the dissertation. In preparing for the general examinations, candidates are expected to make full use of relevant secondary material in modern languages. They should therefore plan to satisfy the requirements in French and German as soon as possible, preferably before the translation examinations. Except in very special circumstances, candidates may not take the general examinations until the modern language requirements have been completed.

3. Each candidate, after passing the general examination, selects a dissertation director who must be a member of the Academic Council. In consultation with the Dissertation Director, the candidate prepares a statement of the dissertation topic to be submitted for approval by the Graduate Committee. When the statement of the dissertation topic has been approved, the candidate, the Dissertation Director, and the Graduate Committee collaborate to select an appropriate dissertation committee.

4. All students are required to undertake the equivalent of four one-quarter courses of teaching under department supervision. This teaching requirement must be completed during the second and third years of study.

Ph.D. MINOR

For a graduate minor, the department recommends at least 20 units in Latin or Greek at the 100 level or above, and at least one course at the graduate (200) level.

CLASSICS AND A MINOR FIELD

The Ph.D. in Classics may be combined with a minor in another field, such as anthropology, history, humanities (see below), classical linguistics (see below), or philosophy. Requirements for the minor field vary, but might be expected to involve about six graduate-level courses in the field and one written examination, plus a portion of the University oral exam. Such a program is expected to take five years. The department encourages such programs for especially able and well-prepared students and is normally able to offer one fellowship each year to support a student in the fifth year of a combined program. The following timetable would be typical for a five-year program:

First Year: course work, almost entirely in Classics. One translation exam taken in June. One or both modern languages exams taken.
Second Year: course work, both in Classics and the minor field. Second translation exam completed. French and German exams completed.
Third Year: course work, both in Classics and the minor field. General examinations in Classics.
Fourth Year: remaining course work, both in Classics and the minor field. General examination in the minor field. Preparation for dissertation.
GRADUATE PROGRAM IN HUMANITIES

The Department of Classics participates in the Graduate Program in Humanities leading to the joint Ph.D. degree in Classics and Humanities. For a description of that program see the “Humanities Special Programs” section of this bulletin.

COMPARATIVE LITERATURE

The Department of Classics cooperates closely with the graduate program in the Department of Comparative Literature. Interested students should consult the chair of the department.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

GREEK

INTRODUCTORY

Those who have not studied Greek begin with Greek 1. The series 1, 2, 3 begins in Autumn Quarter (5 units a quarter). The combined Greek 51/52 course is offered Spring Quarter (five weeks Latin, five weeks Greek for 10 units, two hours a day) and covers the same ground as 1, 2, 3 at a more rapid pace.

The intensive Greek course (Greek 10) offered in the Summer Quarter also prepares students to enter Greek 101 in Autumn Quarter.

The series 101, 102, 103 forms a sequel to Greek 3 and 10. These second-year courses all form part of a series, but qualified students may join the class in Winter or Spring Quarters with the consent of the instructor.

Students whose major work is in another department and who wish to fulfill a departmental foreign language requirement by taking Greek should consult their department advisers to determine the precise nature of that department’s requirements. Most departments are satisfied if part of the series 101, 102, 103 is completed.

All language courses at the 111 level and higher require a term paper.

Courses in Greek all have department prefix 373.

1. First-Year Greek—For beginners.

5 units, Aut (Staff)

2. First-Year Greek—Continuation of 1.

5 units, Win (Staff)

3. First-Year Greek—Continuation of 2.

5 units, Spr (Staff)

10. Intensive First-Year Greek—Intensive beginning Greek equivalent to 1, 2, 3. The goal is the reading of easy classical or New Testament Greek by the end of the Summer Quarter. Short readings in philosophical Greek are included.

8-9 units, Sum (Staff)

51/52. Accelerated First-Year Greek

10 units, Spr (Staff)

INTERMEDIATE/ADVANCED

Students are admitted to these courses by completing Greek 3, 10, or 51/52, or on the basis of previous work done in secondary school or elsewhere. Usually two to three years of secondary school Greek qualifies a student for 101, three to four years for 111. Students with previous knowledge of Greek should consult the Undergraduate Director in Classics to determine the course for which they are best suited. Students who have completed Greek 111 may sign up for one of the Reading Tutorials offered in conjunction with lecture courses in Greek literature, philosophy, and history (listed below under “Courses in Translation”). Students who have completed three years of Greek may take graduate-level courses, beginning with Greek 275 and 202 or 203.


5 units, Aut (Staff)

102. Second-Year Greek—Greek Tragedy, one play.

5 units, Win (Staff)

103. Second-Year Greek—Homer, selected books from the Odyssey.

5 units, Spr (Staff)

111. Third-Year Greek—Prose.

3-5 units, Aut (Staff)

112. Third-Year Greek—Prose.

3-5 units, Win

113. Third-Year Greek—Prose.

3-5 units, Spr

175/275A.B. Greek Syntax—175 is for undergraduates who have taken a minimum of three years of Greek and 275 is for first-year graduate students. The nuances of Greek syntax and style, stylistic analysis of selected prose authors, techniques of sight-translation, and the writing of idiomatic Greek prose.

2 units, Win (Staff)

4 units, Spr (Staff)

370. Advanced Greek Prose or Verse Composition

1-15 units (Staff)

UNDERGRADUATE AND GRADUATE

Note—See undergraduate/graduate Latin.

LATIN

INTRODUCTORY

Those who have not studied Latin may begin with either Latin 1 or 51. The series 1, 2, 3 begins in Autumn Quarter (5 units a quarter); the series
51. First-Year Latin—For beginners.
  5 units, Aut (Staff)

2. First-Year Latin—Continuation of 1.
  5 units, Win (Staff)

3. First-Year Latin—Continuation of 2.
  5 units, Spr (Staff)

10. Intensive First-Year Latin—Intensive beginning Latin equivalent to 1, 2, 3, or 51, 52. The goal is the reading of easy Latin prose and poetry by the end of the quarter.
  8-9 units, Sum (Staff)

51. First-Year Latin—Accelerated.
  6 units, Win (Devine)

52. First-Year Latin—Accelerated; continuation of 51.
  6 units, Spr (Devine)

INTERMEDIATE/ADVANCED

Students are admitted to these courses by completing Latin 3, 10, 51 and 52 or on the basis of previous work done in secondary school or elsewhere. Usually two to three years of secondary school Latin qualifies a student for 101, three to four years for 111. Students with previous knowledge of Latin should consult the Undergraduate Director in Classics to determine the course for which they are best suited. Students who have completed Latin 111 may sign up for one of the Reading Tutorials offered in conjunction with lecture courses in Latin literature, philosophy, and history (listed below, under "Courses in Translation"). Students who have completed three years of Greek may take graduate-level courses, beginning with Latin 175.

  5 units, Aut (Staff)

  5 units, Win (Staff)

103. Second-Year Latin—Selections from Vergil, Aeneid, selected books.
  5 units, Spr (Staff)

111. Third-Year Latin—Poetry, lyric.
  3-5 units, Aut (Staff)

112. Third-Year Latin—Poetry.
  3-5 units, Win (Staff)

  3-5 units, Spr (Staff)

175/275A,B. Latin Syntax—175 is for undergraduates who have taken a minimum of three years of Latin and 275 is for first-year graduate students. The nuances of Latin syntax and style. Stylistic analysis of selected prose authors, the techniques of sight-translation, and the writing of idiomatic Latin prose.
  4 units, Aut (Devine)
  2 units, Win (Devine) (five weeks)

370. Advanced Latin Prose or Verse Composition
  1-15 units (Staff)

GRADUATE

These courses have department prefix 378.

201A,B,C. Introduction to Classical Scholarship
  1 unit, Win (Wigodsky)

202A,B,C-203A,B,C. Survey of Greek and Latin Literature—Required two-year sequence focusing on the origins, development, and interaction of Greek and Latin literature, history, and philosophy. Greek and Latin material is in roughly equal proportions, poetry and prose; organization is generic. Non-Classics majors may take one or more quarters without the language component.

202A. Epic
  4-5 units, given 1998-99

202B. Philosophy and Oratory
  4-5 units, given 1998-99

202C. Greek Drama
  4-5 units, given 1998-99

203A. History
  4-5 units, Aut (Staff)

203B. Lyric and Bucolic
  4-5 units, Win (Staff)

203C. Didactic and Satire
  4-5 units, Spr (Staff)

205A,B. The Semantics of Grammar—Supplements Latin and Greek 275, providing an introduction to the grammatical encoding of semantic and informational meaning. Topics: case, gender, tense, aspect, mood, voice, topic, focus. Provides a theoretical background for teachers of beginning Latin
and Greek and for the analysis of literary and non-literary texts.

2 units, Aut (Devine)
1 unit, Win (Devine)

Some of the above courses may be continued the following quarter by arrangement with the instructor. This usually requires the writing of an extended research paper based on work directly related to the course.

COURSES IN TRANSLATION
UNDERGRADUATE
GENERAL

These courses have department prefix 378.

1. An Introduction to Ancient Egyptian Hieroglyphics—The ancient Egyptian writing system has more than 3,000 years of continuous development covering stories, letters, and documents concerning the history of women, law, economics, and medicine. Introduction to the language and its scripts to be able to read basic texts and inscriptions. The legacy of the ancient Egyptian language and Egyptian texts to the classical world and beyond.

3-4 units, Spr (Manning)

12. Greek Tragedy—The tragedies produced in 5th-century Athens represent a moment in the history of human creativity. Introduces the range and depth of Greek tragedy. Twelve plays by Aeschylus, Sophocles, and Euripides are studied with Aristotle’s Poetics and Aristophanes’ Frogs. Emphasis is on the power and complexity of the poetry, and the connections to fifth-century social and political issues, and the performance conditions and conventions of the ancient theater. GER:3a (DR:7)

3-5 units, Win (McCall)

14N. Stanford Introductory Seminars: History of Liberal Education from Greece to Renaissance—Preference to freshmen. Significant and critical periods in the history of Western education, examining the processes of social and cultural transformation. Materials and sites of education and theoretical accounts, ancient and modern. The education of women, the role of slaves and slavery, corporal punishment, the teaching of literacy, the polemics of liberal vs. technical education, debates about curricular change.

3 units, Win (Bloomer)

15N. Stanford Introductory Seminar: Ecology in Philosophy and Literature—Preference to freshmen. The basic principles of ecological thinking, and conceptions of the “natural” world offered in Western literature and philosophy. What is nature, and where do humans fit in the natural world? If we are animals, then why are we behaving like gods? How exactly do animals differ from other animals? Do these differences make us superior beings? What is “ecological wisdom” and how does it re-orient us in relation to the word? Recent works on deep ecology, eco-feminism, and seminal writers (Plato, Descartes, Wordworth, Thoreau, Gary Snyder, and Edward Abbey). GER:3a (DR:8)

3 units, Win (Nightingale)

18. Greek Mythology—The heroic and divine in the literature, mythology, and culture of archaic Greece. Interdisciplinary approach to study of individual and society. Illustrated lectures. Selected readings, in translation, of Homer, Hesiod, Herodotus, the poets of lyric and tragedy. GER:3a (DR:8)

3-4 units, Spr (Staff)

19N. Stanford Introductory Seminar: Gospel of John—Its Early History as a Controversial Text—Preference to freshmen. What do we know of the fourth Gospel’s composition, “sponsoring community,” the battles surrounding its acceptance as a canonical Gospel, and the differences between Gnostic Christian and anti-Gnostic Christian ways of reading the document? The earliest versions of the text (with their variants) and its language, the thought-world of the book (is it “Greek” or “Jewish”?), and four commentators on the Gospel of John who disagree about its basic meanings: two 3rd-century antagonists, and two from the 20th century. GER:3a (DR:8)

3 units, Spr (Gregg)

104. Early Christianity—The Christian movement to 500 A.D.; emergent beliefs/practices as these distinguished Christians from other groups, and as they varied among Christians. Study of primary documents (ancient texts in translation) and surviving art/architecture examines early Christianity’s modes of community organization, debates about orthodox and heretical teaching, and interactions with other religions. Thematic interest concerns deployment of “holy power” in people, places, objects. GER:3b (DR:9)

5 units, Win (Gregg)

117. Gender, Violence, and the Body in Ancient Religion—Greek religious rites of gender reversal: Bacchanalian ecstasy in Greece and Rome; exquisite suffering: martyrdom as erotic spectacle; harlots of the desert who mortified the flesh; holy anorexia: the search of medieval women for spiritual transcendence. The changing meanings assigned to the body in the ancient world’s search for holiness, why contact with the divine was often manifested violently, how ancient concepts of gender informed ritual practice, and how Christianity’s idealization of the suffering body offered new problems and possibilities for women. GER:3b,4c (DR:9+)

3-4 units, Aut (Stephens, Gleason)

139. Medicine in Ancient Greece and Rome—Modern Western medical science traces its origins to classical Greece. Its founders viewed it as a philosophy of nature and as a practice of therapy. Themes of medical theory and practice through writings, particularly Hippocrates and Galen. GER:3b (DR:9)

4 units, Win (Stephens)
165. Hellenistic Philosophy—Stoicism and Epicureanism as comprehensive systems of philosophy, attempting to base ethics on theories of nature; the skeptics attack of those attempts. Recommended: course work in earlier Greek philosophy.
4 units, Aut (Wigodsky)

166. Classical Influences on Modern Literature—imitations of classical models and genres, and themes from myth and ancient history in Renaissance and later literatures.
3-5 units, Spr (Wigodsky)

169. Introduction to the Ethics of Socrates, Plato, and Aristotle—The ethical philosophy of Socrates, Plato, and Aristotle, and its relation to traditional Greek notions of goodness and happiness. The ideological systems (gender, sexuality, race, and class) which these thinkers set out to corroborate or contest. The nature of philosophic language and its relation to other kinds of discourse (especially poetry and rhetoric). GER:3a (DR:7 or 8)
4-5 units, Win (Nightingale)

176. Majors Seminar: Interpreting Antiquity—The field of Classics, including an introduction to basic theoretical issues in classical literature, history, and philosophy. The evolution and coherence of the discipline of classics, and the various ways in which antiquity was/is appropriated by postclassical cultures. (WIM)
3-5 units, Win (Manning)

CLASSICS/HISTORY
These courses have department prefix 371.

1A. Introduction to the Humanities Program: Ancient Mediterranean World I—From the Beginnings to the Fall of Persia, 3000-301 B.C.—Introduction to the civilizations of the ancient Mediterranean world. The early city-states of Sumer, and the increasing hierarchy of the Bronze Age civilizations of Egypt, Mesopotamia, and Anatolia, and their sudden collapse around 1200 B.C. The emergence of smaller Iron Age states and the conflicts within them over class, gender, and ethnic boundaries: the emergence of new forms of imperialism in Assyria and Persia; Alexander of Macedonia's destruction of the Persian empire, ending an era. Most readings are ancient sources in translation, and emphasize understanding varied cultures in their own terms. (1A must be taken in conjunction with 1B to fulfill second and third quarters of the Area 1 requirement.)
4-5 units, Win (Morris)

1B. Introduction to the Humanities Program: Ancient Mediterranean World II—The Age of Empires, 301 B.C.-A.D. 640—Introduction to a millennium-long age of imperialism in the ancient Mediterranean world. The development of ever-larger systems of exploitation, the collapse of the Persian empire and the imposition of Greek colonial regimes, the unification of the Mediterranean world by the Romans, the revival of Persian power, and the Arab conquests of the 7th century. Emphasis is on the interactions between local culture and imperial power; the forms of imperial control; and the effects of mass enslavements, devastating war, and the polarization of wealth. Most readings are ancient sources in translation, and emphasize understanding varied cultures in their own terms. (1B must be taken in conjunction with 1A to fulfill second and third quarters of the Area 1 requirement.)
4-5 units, Spr (Morris)

101. History of Greece—The social, political, economic, and cultural history of ancient Greece, from the fall of the Bronze Age palaces (c.1200 B.C.) to the death of Alexander the Great (323 B.C.). Focuses on the class and gender structures of Athenian democracy, and on the struggles for power between the Greek city-states. Readings from original sources in translation. GER:3b (DR:9)
4-5 units, Aut (Manning)

101A. Reading Tutorial in History—In Greek.
3-4 units, Aut (Staff)

102. Roman History I: The Republic—How did Rome grow from a village to the capital of a Mediterranean empire? The underlying factors of culture, customs, and structures of Rome in the context of a world of tribes and city-states. For the later period, contemporary texts. GER:3b (DR:9)
4-5 units, Win (Treggiari)

103. Roman History II: The Empire—The Roman Empire from the dictatorship of Julius Caesar and the Principate of Augustus through the consolidation of the system and the brink of its later crisis. Emphasis is on the achievement of Augustus in establishing a constitutional system, the Principate, which gave relative peace and security to the Roman world for 250 years; the subsequent history of the Julio-Claudian dynasty; the life and culture of the empire (Mediterranean lands and Europe) during the first two centuries A.D., and the contribution of Rome to the cultures of western Europe and its successors (e.g., literature, architecture, law, the transmission of Greek and Judeo-Christian ideas, and the acculturation of Romans to non-Romans and the non-transmission of Roman culture elsewhere). Contemporary texts and archaeological data where possible. GER:3b (DR:9)
4-5 units, Spr (Treggiari)

105. History and Culture of Egypt—Surveys Ancient Egyptian culture from the Pharaonic period to the Arab conquest, with its achievement and influence on other Mediterranean societies. The representation and misrepresentation of this ancient culture that prevailed in the West from time of the Renaissance. GER:3b, 4a (DR:2 or 9)
4-5 units, Spr (Manning)

108A. Reading Tutorial in Late Antiquity—In Greek or Latin.
3-4 units, Aut (Staff)
121. Slavery Ancient and Modern—How and why slave labor becomes important in some societies; the relationships between slavery, serfdom, and free labor; the violent domination of slaves; slave resistance and rebellions; and the collapse of servile economies. Emphasis is on comparative approaches; case studies taken from ancient Greece and Rome and modern Africa and America.

3-4 units, not given 1997-98

CLASSICS, ART/ARCHAEOLOGY
Courses in Classical Art and Archaeology have department prefix 372.

20. Introduction to Classical Archaeology—Hands-on approach to Minoan and Mycenaean, Greek, Etruscan, Roman, and related Mediterranean cultures, introducing cross-disciplinary archaeology by its material remains, with emphasis on aesthetic and engineering questions. Objects and forms in architecture and stone media, ceramics and glass, metals in jewelry, weapons, tools and coins, frescoes and wall-paintings, and ancient technology through workshops and labs with material objects and slide lectures. Field sessions on archaeological methods and techniques of ancient goldworking, stoneworking, and reconstruction of archaeological sites by stratigraphy, seriation and topography, and conditions of material survival.

4 units, Aut (Hunt)

100A. Archaic Greek Art
4 units, Aut (Maxmin)

100B. Classical and Hellenistic Art
4 units, Win (Maxmin)

100C. Ancient Art III: Roman Art
4 units, Spr (Maxmin)

120A. Undergraduate Colloquium: Greek Art—
(Same as Art 202.)
4 units, Aut (Maxmin)

INDIVIDUAL STUDY
These courses have department prefix 378.

160. Directed Reading (Undergraduate)
1-15 units, any quarter (Staff)

199. Undergraduate Thesis
6-10 units, any quarter (Staff)

260. Directed Reading (Graduate)
1-15 units, any quarter (Staff)

360. Dissertation Research
1-15 units, any quarter (Staff)

GRADUATE SEMINARS
Graduate seminars vary each year. The following are given this year.

ANCIENT HISTORY (371)

388A.B. Roman Social History—Introduces the subject-matter problems and methods of Roman historians. The material of the individual presentations which each student of the group makes (orally and written) is chosen in light of the individual's interests and previous experience in the field. Some focus is on literary texts which form part of the Stanford reading list. Some may work on epigraphic or juristic sources. Emphasis is on 70 B.C.-A.D. 200. Continues for 5 weeks of Spring Quarter.

4-5 units, Win (Treggiari)
2-3 units, Spr (Treggiari)

GREEK (373)

337. Odyssey—Readings from the Odyssey and from contemporary Odyssey criticism, including narratology and feminist theory. Identifies Odyssey themes and accounts of performance, and interprets the Odyssey's perspective on human agency and relations between mortals and gods. The relationships constructed in the poem between language and gender, poetry, and other types of storytelling, and narrative and nostos "return.”

4-5 units, Aut (Mackie)

320A,B. Religion and Society in Classical Greece—The role of religion in Greek society and the nature of the evidence (literary, epigraphic, and archaeological). Focuses on religious practice and thought in 4th-century Athens. Ends after five weeks of Winter Quarter.

4-5 units, Aut (Jameson)
2-3 units, Win (Jameson)

442. Horaces’ Literary Satires and Epistles—The Ars Poetica and its background in Hellenistic literary theories.

4-5 units, Aut (Wigodsky)

LATIN (375)

315. Ovid’s Metamorphoses—Seminar on Ovid’s Metamorphoses, focusing on the conception of the body and the self against the poem’s cultural and literary background. Focus is the poem’s representation of violence, suffering, gender, art, and the artist. The influence of the gladiatorial show; Ovid’s “baroque” or “counter-classical” aesthetic; Ovid’s relation to his literary and cultural tradition, especially Virgil, Lucretius, elegy, and Hellenistic poetry.

4-5 units, Win (Segal)

335. Novel
4-5 units, Spr (Conte)

COMMUNICATION

Emeriti: (Professors) Elie Abel, Richard A. Brody, Lyle M. Nelson; (Professors—Teaching) Ronald Alexander, Marion Lewenstein
Chair: Steven H. Chaffee
Director, Institute for Communication Research: Byron B. Reeves
The Department of Communication engages in research in communication and offers curricula leading to the A.B., A.M., and Ph.D. degrees. The A.M. degree prepares students for research on mass media or for careers in journalism or documentary film and video. The Ph.D. degree leads to careers in teaching and research-related specialties.

The Institute for Communication Research offers research experience primarily to advanced Ph.D. students.

The John S. Knight Fellowship Program brings promising mid-career professional journalists to the University to study for nine months in a non-degree program. Twelve U.S. journalists are joined by six International Fellows sponsored by Reuters Foundation, the Knight Foundation, and others.

ADMISSION

Prospective Undergraduate Students—Write to the University's Office of Undergraduate Admissions, Stanford University, Stanford, California 94305.

Prospective Graduate Students—Write to Graduate Admissions, the Registrar's Office, Stanford University, Stanford, CA 94305-3005.

The department requires that applicants for graduate admission submit verbal and quantitative scores from the Graduate Record Examination (GRE). Admission to each graduate degree program is competitive based on the pool of applicants each year rather than on standard criteria that can be stated in advance.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The undergraduate curriculum is intended for liberal arts students who wish to develop a fundamental understanding of communication in society, drawing on the perspective of the social sciences. Undergraduate students majoring or minoring in communication are expected to become acquainted with the fundamental concerns, theoretical approaches, and methods of the field, and to acquire advanced knowledge in one or more of the subareas of communication institutions, processes, and effects.

While the department does not attempt to provide comprehensive practical training at the undergraduate level, the curriculum provides opportunities for professional practice including courses in print and broadcast journalism, visual communication (film/video), and internships.

The department is committed to providing students with the analytical and critical skills that are necessary for future success, be it in graduate programs, professional schools, or immediate career entry.

The major is structured to provide several levels of study: a core curriculum, intended to expose students to a broad-based understanding of communication theory and research, and a number of intermediate-level options and electives. Majors also have the opportunity to do advanced research in the form of senior projects and honors theses.

All undergraduate majors are required to complete a set of core Communication courses which include 1, Introduction to Communication (5 units); 106, Communication Research Methods (4 units); and 108, Communication Process and Effects (4 units).

Students must also complete an introductory course in Statistics (typically Psychology 10 or Statistics 60) in preparation for courses in methodology and advanced courses in communication processes and effects. We recommend that this be done as soon as possible so as not to prevent registration in a course requiring statistical understanding.

In addition to the core courses and the statistics requirement, undergraduate majors and minors select courses from the areas described below. Many of the courses require core courses as prerequisites.

Area I: Communication Processes and Effects—Area I emphasizes ways in which communication scholars conduct research in, and consider the issues of, human communication. These studies aim to provide expert guidance for social policy makers and media professionals. A minimum of three courses must be taken from Communication 137, 155, 157, 160, 166, 169, 170, 172, 173.

Area II: Communication Systems/Institutions—Area II considers the roles and interaction of institutions such as broadcasting, film, journalism, constitutional law, and business within communication and mass communication contexts. A minimum of two courses must be taken from Communication 110, 116, 122A,B, 125, 131, 139, 140, 141A,B, 142, 176, 178.
Area III: Professional Practices—Area III provides experiential opportunities with courses in news writing and reporting, broadcasting, and film and video. However, the undergraduate major and minor are not intended as narrow vocational preparation for a professional career in the media. Rather, the curriculum is designed to provide basic knowledge that can be effectively adapted and applied to a professional environment. A minimum of two courses must be taken from Communication 104, 114, 136, 150, 175, 177, 180.

To be recommended for the A.B. degree in Communication, the student must complete at least 50 units (approximately thirteen courses) in the department. No more than 12 units of transfer credit or Summer Session, and no more than 4 units of independent study credit, may be applied to meet department requirements. Communication majors and minors must receive a letter grade for all communication courses unless they are offered only for Satisfactory/No Credit (S/NC).

Students interested in declaring the major or minor should see the peer advisers in the library of the first floor of Building 120, or the Student Services Administrator in room 434.

MINORS
The minor in Communication consists of three introductory courses: Communication 1, Introduction to Communication (5 units); 106, Communication Research Methods (4 units); and 108, Communication Process and Effects (4 units), successful completion of which is prerequisite for most additional course work in the minor.

In addition to core courses, the minor requires a minimum of four intermediate-level elective courses (minimum of 28 units) in the department. The department also requires completion of or concurrent registration in an introductory Statistics course (Statistics 60, 70, or Psychology 10), prior to registration in Communication 106, Communication Research Methods. It is strongly recommended that the course in Statistics be taken as early as possible, preferably in the Autumn Quarter of the junior year.

The minor is structured to provide a foundation for advanced course work in communication through a broad-based understanding of communication theory and research.

Students interested in declaring a minor must do so no later than registration in the Autumn Quarter of the junior year. Core courses are offered only once annually, and they constitute a sequence. Students should consult the department's Student Services Administrator, room 434, Building 120.

Prerequisite: Introductory Statistics Course (for example, Psychology 10)
Core Courses: Communication 1, 106, 108

Area I, Communication Processes and Effects: A minimum of one course from Communication 137, 155, 157, 160, 166, 169, 170, 172, 173

Area II, Communication Systems and Institutions: A minimum of two courses from Communication 110, 116, 122A,B, 125, 131, 139, 140, 141A,B, 142, 176, 178

Some courses are not given every year. Refer to the course listing and the Time Schedule each quarter for details.

HONORS PROGRAM
The honors program provides undergraduates the opportunity to undertake a significant program of research in an individual professor/student mentoring relationship. The aim is to guide students through the process of research, analysis, drafting, rethinking, and redrafting, which is essential to excellence in scholarship. Working one-on-one with a faculty adviser, seniors may earn between 5 and 15 Communication units, culminating in an honors thesis. In order to be eligible for the honors program, interested majors must have: (1) successfully completed both a research methods and statistics course, (2) selected an adviser, and (3) submitted an application to the department by the end of their junior year. Applications may be picked up outside of room 110 in Building 120.

A final copy of the honors thesis must be read and approved by the adviser and submitted to the department by the eighth week of Spring Quarter (May 22). It becomes part of a permanent record held by the department. Honors work may be used to fulfill communication elective credit but must be completed and a letter grade submitted prior to graduation. A student failing to fulfill all honors requirements may still receive independent study credit for work completed and it may be applied toward fulfilling major requirements.

The designation "graduation with honors" is awarded by the Department of Communication to those graduating seniors who, in addition to having completed all requirements for the Communication major:
1. Complete an honors thesis
2. Maintain a distinguished grade average in all communication course work
3. Are recommended for distinction by the Communication faculty

COTERMINAL PROGRAM
The Department of Communication offers students who are completing an A.B. in another department a coterminal program with an A.M. emphasis in Media Studies; applications can be picked up at Degree Progress, the Registrar's Office, room 131, Old Union.

Application for coterminal study must be submitted at least four quarters in advance of the
expected master's degree conferral date. Stanford undergraduates may apply as early as the eighth quarter (or upon completion of 105 units) but no later than the eleventh quarter of undergraduate study. Requirements include: Application for Admission to Coterminal Master’s Program, preliminary program proposal, statement of purpose, three letters of recommendation from Stanford professors, and a current Stanford transcript. GRE scores are required; a request must be submitted to Graduate Admissions, Registrar’s Office. Coterminal applications are submitted directly to the department. Review procedures and criteria are determined by the Graduate Admissions Committee.

GRADUATE PROGRAMS
MASTER OF ARTS
The department awards terminal A.M. degrees in three fields: Documentary Film and Video Production; Journalism; and Media Studies. Applicants for each program, and for doctoral work, are evaluated for admission on different criteria. (Students who complete an A.M. degree and who desire entry into the Ph.D. program must file a new application for admission and are considered alongside all other doctoral applicants.) A student may complete more than one A.M. degree in the department, but course work applied to the requirements for one A.M. degree may not be applied to a second. All work to fulfill graduate degree requirements must be in courses numbered 100 or above.

DOCUMENTARY FILM AND VIDEO
The graduate program in documentary film and video is a master’s program designed to train students in the conceptual and craft skills for the production of nonfiction film and video.

RESIDENCY
The program requires continuous enrollment for a period of two academic years, with a completion date of June in the second year. Students proceed through the program as a cohort. The degree requires three full terms of registration in the first year. In the second year, full-time registration is required in the Autumn Quarter, with half-time registration the remaining two quarters. Full-time registration consists of a minimum of 11 units; half-time registration consists of 9 units. The residency requirement is calculated on the basis of terms of registration and not on the basis of total number of units earned. The program does not allow for leaves of absence.

CURRICULUM
The curriculum is intended to teach an array of technical and conceptual skills as well as relevant historical and theoretical knowledge.

First-Year Curriculum—
Autumn Quarter
202A. Graduate Colloquium in Film and Television
222A. Documentary Film
223A. Documentary Film/Video Directing I
224A. Film Production I
Winter Quarter
202B. Graduate Colloquium in Film and Television
223B. Documentary Film/Video Directing II
224B. Film Production II
Elective (3-4 units)
Spring Quarter
202C. Graduate Colloquium in Film and Television
223C. Documentary Film/Video Directing III
224C. Film Production III
Elective (3-4 units)

Second-Year Curriculum—
Autumn Quarter
202A. Graduate Colloquium in Film and Television
222B. Documentary Film
292A. Documentary Film/Video A.M. Project Seminar I
Winter Quarter
202B. Graduate Colloquium in Film and Television
292B. Documentary Film/Video A.M. Project Seminar II
Spring Quarter
202C. Graduate Colloquium in Film and Television
292C. Documentary Film/Video A.M. Project Seminar III

ELECTIVES
Up to three electives may be from Department of Communication courses, including the required two-course sequence of documentary history classes taken in the Autumn Quarter of the first and second year. Some elective courses are not offered every year, and there may be time conflicts with core courses. Students should consult the University Time Schedule each quarter for current information.

Each term, courses that are relevant to the curriculum may be offered by other departments at Stanford. We require that at least one elective be taken outside the department. A list of approved electives, both within and outside the department, is provided each quarter. Other electives relevant to the subject matter of the A.M. project may be substituted, with permission of your adviser.

EQUIPMENT AND SUPPLIES
The department maintains film and video production facilities for teaching and research purposes. However, the costs of supplies and processing services are the responsibility of the students.

In the first year, students purchase a “course kit” at the beginning of each quarter which includes sufficient materials to complete the assignments. Once students have depleted the supplies in the course kit, subsequent purchases are made at outside vendors. The expense for normal film processing is included in the course kit fee during the Autumn and Winter Quarters, but each student sets up an account directly with a film lab
Media Studies students must complete 42 units in Communication and related areas in the social sciences and humanities, maintaining high academic standing throughout. In consultation with professors, students must also complete extensive
projects in two of the required communication courses listed below.

Required core courses:
206. Communication Research Methods
208. Communication Process and Effects
Stat. 160. Introduction to Statistical Methods

A minimum of six additional courses must be taken in the department from:
201. Film Aesthetics
216. Media Law
217. Journalism and the Internet
225. Perspectives on American Journalism
231. Media Ethics and Responsibility
233. Communication and Culture
236. Broadcast Journalism
237. The National Information Infrastructure
241. History of Film
255. Interethnic Communication
260. Political Communication
266. Communication Policy in Comparative Perspectives
269. Computers and Interfaces: Psychological and Social Issues
272. Psychological Processing of Media
283. Media Economics
318. Doctoral Research Methods II
319. Doctoral Research Methods III

Not all of these courses are offered every year. Additional courses are selected in consultation with an academic adviser. A course in statistical methods is strongly recommended.

DOCTOR OF PHILOSOPHY

The department offers the Ph.D. in Communication Theory and Research. First-year students are required to complete introductory courses in communication theory and research, research methods, and statistics. These core courses are grounded in the social science literature emphasizing how people respond to communication and media and how media institutions function. In addition, Ph.D. students must complete a minimum of three literature survey courses and three advanced seminars in communication and related departments. Each student builds a research specialty relating communication to current faculty interests in such areas as information processing, ethnic identity, law, human-computer interactions, politics and voting, ethics, and information technology. Regardless of the area of specialization, the Ph.D. program is designed primarily for students interested in teaching and research careers or policy formation positions.

The Ph.D. program encompasses four years of graduate study (subsequent to completion of the A.B. degree) during which, in addition to fulfilling University residency requirements, Ph.D. candidates are required to:

1. Complete all departmental course requirements with above average graduate grades, normally defined as a minimum grade point average (GPA) of 3.5. Currently these courses include Communication 206, 208, 311, 317, 318, 319, and a sequence in statistics (for example Statistics 160) that includes multiple regression and complex analysis of variables.

2. Pass the general qualifying examinations by the end of the second academic year of study and pass a specialized area examination by the end of the third academic year of study.

3. Demonstrate proficiency in tools required in the area of research specialization. Chosen with the advice of the faculty, such tools may include advanced statistical methods, computer programming, a foreign language, or other technical skills.

4. Complete two predissertation research projects.

5. Teach or assist in teaching at least two courses, including Communication 1.

6. Complete a dissertation satisfactory to an advisory committee of three or more faculty members.

7. Pass the University oral examination, which is a defense of the dissertation.

Because the multifaceted nature of the department makes it possible for the Ph.D. student to emphasize several areas of communication study, there tend to be several "typical" programs of course work followed by students, depending on their specialties. Variation in course programs worth occurs after the first year of graduate study; the first year is devoted primarily to the "core" courses required of all doctoral students.

In addition, students must complete other advanced Communication theory and research courses preparatory to their particular specializations. Specification of these courses depends on (1) individual student needs to prepare for preliminary and area examination, and (2) the requirements of the particular area of emphasis chosen by the student.

Ph.D. candidacy is valid for five years. Extensions of candidacy are rarely granted and require reexamination.

Ph.D. MINOR

Candidates for the Ph.D. degree in other departments who elect a minor in Communication are required to complete a minimum of 20 units of graduate courses in the Department of Communication, including a total of three theory or research methods courses, and are examined by a representative of the department. The particular communication theory and methods courses are determined by a department adviser in consultation with the individual student.
THE INSTITUTE FOR COMMUNICATION RESEARCH

The Institute is an office of project research for the faculty of the Department of Communication and operates under grants to faculty from foundations, communication media, and other agencies. Research assistantships are often available to qualified Ph.D. students in communication.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

PRIMARILY FOR UNDERGRADUATES

1. Mass Communication and Society: Media Technologies, People, and Society—Open to non-majors. Fundamental concepts and contexts of communication introduced. A topics-structured orientation emphasizing the field and the scholarly endeavors represented in the department. Lectures plus one-hour weekly discussion sections. GER:3b (DR:9)
   5 units, Aut (Nass, Reeves)

101. Film Aesthetics—(Graduate students register for 201.) Theoretical, historical examination of the nature of the film medium. Emphasis is on the problems of aesthetics and communication from the viewpoints of practitioner, critic, and audience.
   4 units, Spr (Breitrose)

104. Reporting and Writing the News—Reporting and writing, emphasizing various forms of journalism: news, interpretation, features, opinion. Detailed criticism of writing. Prerequisite: typing speed of 35 wpm. (WIM)
   4 units, Aut, Win, Spr, Sum (Staff)

106. Communication Research Methods—(Graduate students register for 206.) Conceptual and practical concerns underlying commonly used quantitative approaches (experimental, survey, content analysis, and field research) in communication. Students become acquainted with the techniques of research so they may become intelligent consumers and practitioners of research. Lectures plus one-hour weekly discussion sections. GER:3b (DR:9)
   4 units, Aut (Leets)

108. Communication Process and Effects—(Graduate students register for 208.) Discussion of the process of communication theory construction, including a survey of social science paradigms and major theories of communication. Lectures plus one-hour weekly discussion sections. GER:3b (DR:9)
   4 units, Aut (Staff)

110. Communication and Law—(Graduate students register for 210.) The interactions among freedom of expression, communication, and American law. Issues such as pornography and campus speech codes introduce the application of communication research to law and policy formation. Students consider assumptions about communication in law and the effects of law and communication on each other.
   4 units (Staff) not given 1997-98

114. Introduction to the Moving Image—For junior or senior Communication majors only. Students acquire the basic practical and conceptual skills to write, shoot, direct, and edit. Prerequisites: I, consent of instructor.
   5 units, Aut (Krawitz)
   Spr (Samuelson)

116. Media Law—(Graduate students register for 216.) Law and government regulation impacting on journalists. Topics: libel, privacy, news gathering, protection of sources, fair trial and free press, theories of the First Amendment, broadcast regulation, etc.
   5 units, Win (Staff)

122A. Documentary Film—(Graduate students register for 222A.) Analysis of the techniques and strategies of films designed to effect attitudinal and behavioral change. Prerequisite: consent of instructor.
   4 unit, Aut (Breitrose)

122B. Documentary Film—(Graduate students register for 222B.) Issues in contemporary documentary film/video including objectivity/subjectivity, ethics, censorship, representation, reflexivity, responsibility to the audience and authorial voice. Viewing and analysis of films has parallel focus on form and content. Prerequisite: consent of instructor.
   4 units (Krawitz)
   alternate years, given 1998-99

125. Perspectives on American Journalism—(Graduate students register for 225.) Survey of issues, ideas, and concepts in the development of American journalism, emphasizing the role of the press in society, meaning and nature of news, and professional norms that influence conduct in and outside of the newsroom. Prerequisite: 1 or junior standing. GER:3b (DR:9)
   4 units, Aut (Glasser)

131. Media Ethics and Responsibility—(Graduate students register for 231.) The development of professionalism among American journalists, emphasizing the emergence of objectivity as a professional and epistemological norm. An applied ethics course where questions of power, freedom, and truth autonomy are treated normatively so as to foster critical thinking about the origins and implications of commonly accepted standards of responsible journalism.
   4 units, Spr (Glasser)
133. Communication and Culture—(Graduate students register for 233.) The relationship between communication and culture, emphasizing the mass media and their symbolic import. GER:3b (DR:9)
4 units, Win (Glasser)

136. Broadcast Journalism—(Graduate students register for 236.) Survey of broadcast journalism, focusing on commercial and public broadcast news outlets. Students are introduced to broadcast news writing and prepare tapes for radio news broadcast. Lab. Prerequisite: 104.
4 units, Win (Staff)

137. The National Information Infrastructure; The U.S. Policy Debate—(Graduate students register for 237.) Policy issues surrounding the emergence of a National Information Infrastructure (NI) in the U.S. Adopting a pluri-disciplinary approach, examines the historical context of the policy debate, the technical and business aspects of the networking transformation underway, and its economic and social dimensions. GER:3b (DR:9)
4 units, Aut (Bar)

140. History of American Journalism—(Graduate students register for 240.) Evolution of the democratic mass media in its social, political, economic, technological, and professional aspects.
4 units (Staff) not given 1997-98

141A. History of Film: The First 50 Years—(Graduate students register for 241A.) Studies in the development of the motion picture as an art form and cultural industry. Lab. Screenings of films announced in class.
4 units (Breitrose)
alternate years, given 1998-99

141B. History of Film: The Second 50 Years—(Graduate students register for 241B.) The evolution of the motion picture as an art form and culture industry in the U.S. and other nations from 1941. Topics: the decline of the studio system, the impact of WW II, the rise and fall of the auteur cinema, television, industrial concentration and its effects, and the “high concept” film. Mandatory evening screenings.
4 units, Win (Breitrose)

4 units (Breitrose) not given 1997-98

1 unit, Win (Leets)

150. Magazine Writing—(Graduate students register for 250.) Practice in writing magazine articles, with emphasis on marketing manuscripts. Conferences. Prerequisite: 104.
4 units, Win (Maharidge)

155. Interethnic Communication—(Graduate students register for 255.) Working from an intergroup perspective, examines the influence of ethnicity on the process of interpersonal communication. The problems and opportunities inherent in communication among people from different ethnic heritages and value orientations, and the steps relevant for improving interethnic communication. GER:3b (DR:9)
4 units, Win (Leets)

157. Public Communication Campaigns—(Graduate students register for 257.) Emphasizes health information programs and their effects on public knowledge, attitudes, and behavior; information programs concerned with energy conservation, environmental protection, educational and occupational opportunity, consumerism, etc. The interplay of research and fieldwork is analyzed in case studies of successful programs.
4 units (Staff) not given 1997-98

166. Communication Policy in Comparative Perspectives—(Graduate students register for 266.) A comparative overview of the ongoing change in the communications policy environment of different countries. How different nations are tackling the transformation, the reasons for these differences, and the impact of distinct policy approaches on the respective national economies and societies. GER:3b (DR:9)
4 units, Win (Bar)

160. Political Communication—(Graduate students register for 260.) Analysis of the role of mass media and other channels of communication in political and electoral processes.
4 units (Staff) not given 1997-98

169. Computers and Interfaces: Psychological and Social Issues—(Graduate students register for 269.) Interdisciplinary approach to issues of human-computer interaction (primarily) and computers and society (secondarily). General models of the link between technology, psychology, and society, addressing the question of which is/are cause and which is/are consequence. Issues: anthropomorphism and interface design; what is a human; conversation and interfaces; metaphors in interfaces; identity, privacy, and computing; and computer-mediated communication. GER:3b (DR:9)
4 units, Win (Nass)

170. Communication and Children—(Graduate students register for 270.) Developmental approach to how children come to use and process mass media, what information they obtain, and how their behavior is influenced by the media. Prerequisite: 1, Psychology 1, or Sociology 1.
4 units (Staff) not given 1997-98
172. Psychological Processing—(Graduate students register for 272.) Examines literature related to psychological processing and the effects of media. Topics: unconscious processing, picture perception, attention and memory, emotion, physiology of processing media, person perception, pornography, consumer behavior, advanced film and television systems, and differences between reading, watching, and listening. GER:3b (DR:9)
4 units, Win (Reeves)

176. International Communication—(Graduate students register for 276.) Comparative study of national media systems and the policy issues arising from existing imbalances between developed and developing countries.
4 units (Staff) not given 1997-98

177. Specialized Workshops—(Graduate students register for 277.) One or more classes are offered in specializations such as science or sports writing, or other areas. Organized around writing projects oriented toward the field of specialization.
177A. Opinion Writing—(Graduate students register for 277A.)
4 units, Win (Woo)
177B. Science Writing—(Graduate students register for 277B.)
4 units (Staff) not given 1997-98
177D. Environmental Reporting—(Graduate students register for 277D.)
4 units (Staff) not given 1997-98
177F. Feature and Analytical Writing—(Graduate students register for 277F.)
4 units (Staff) not given 1997-98
177G. Social Issues Reporting—(Graduate students register for 277G.)
4 units, Spr (Maharidge)
177J. Specialized Reporting Course—(Graduate students register for 277J.)
4 units (Staff) not given 1997-98

178. Newsroom Management: Problems and Strategies in an Era of Change—(Graduate students register for 278.) Issues confronting newsroom leaders and managers in an environment of economic and technological change. Responses and strategies of newsrooms to the challenges of declining circulation and increasing competition for advertising revenue and readers’ attention and recent developments in the movement for changes in public journalism and newsroom restructuring. Prerequisite: consent of instructor.
4 units (Staff) not given 1997-98

180. Film Criticism—(Graduate students register for 280.) A practical and critical view of film. Readings/discussion consider models of artistic and literary criticism as points of comparison. Weekly reviews stress the analysis of the films and a lucid writing style. Prerequisite: 101 or 141.
4 units (Breitrose)
alternate years, given 1998-99

183. Media Economics—(Graduate students register for 283.)
4 unit, Spr (Bar)

185. Internship Experience—Professional experience in the media. Prerequisite: Communication major.
1-4 units, Aut, Win, Spr (Staff)

190. Senior Project—Research project or production of a finished piece of work in journalism or film. A combination of the senior project and an internship is possible. Prerequisite: senior standing.
5 units, Aut, Win, Spr (Staff)

195. Honors Thesis—Qualifies students to conduct communication research.
5-15 units, Aut, Win, Spr (Staff)

199. Individual Work—Communication majors with high academic standings are permitted to undertake individual work.
1-4 units, any quarter (Staff)

PRIMARILY FOR
MASTER’S STUDENTS

201. Film Aesthetics—Graduate section; see 101.
202A,B,C. Graduate Colloquium in Film and Television—Topics in film and television focusing mainly on production-related issues. Prerequisite: A.M. student in film or television program.
1 unit, Au (Samuelson)
Win (Krawitz)
Spr (Breitrose)

204. Reporting and Writing the News—Reporting and writing, emphasizing the various forms of journalism: news, interpretation, features. Assignments are completed under realistic time and space constraints. Lectures and lab focus on skills needed to produce polished publishable material.
5 units, Aut (Staff)

206. Communication Research Methods—Graduate section; see 106.

207. Editing the News—Copy editing, headline writing, news display, and photo cropping. Lab includes editing copy, Associated Press style, news circulation, and page make-up.
2 units, Win (Staff)

208. Communication Process and Effects—Graduate section; see 108.

210. Communication and Law—Graduate section; see 110.

216. Media Law—Graduate section; see 116.

217. Journalism and the Internet—The implications of new media for journalists. Professional and
social issues related to the Internet as a case of new media deployment, as a story, as a research and reporting tool, and as a publishing channel. Seminar discussion and hands-on practicum.

4 units, Win (Bar)

222A. Documentary Film—Graduate section; see 122A.

223A. Documentary Film/Video Directing I—For graduate students. Emphasis on conceptualizing and executing ideas for the production work done jointly with 224A. Covers all aspects of pre-production at an introductory level. Prerequisite: admission to the A.M. Documentary Film and Video program.

5 units, Aut (Samuelson)

223B. Documentary Film/Video Directing II—For graduate students. Further professional training in preproduction and producing for motion pictures and television. Interview skills and other documentary directing techniques are developed utilizing video. Prerequisite: 223A. Corequisite: 224B.

5 units, Win (Staff)

223C. Documentary Film/Video Directing III—For graduate students. Further examination of structure, emphasizing writing and directing the documentary. Practical training in fundraising and distribution. Prerequisite: 223B. Corequisite: 223C.

5 units, Spr (Samuelson)

224A. Documentary Film Production I—For graduate students. First of a three-quarter sequence leading to professional training in motion picture production. 16mm exercises and a short 16mm non-synchronous film with multiple sound tracks and sound effects. Corequisite: 223A.

3 units, Win (Krawitz)

224B. Documentary Film Production II—For graduate students. Produce a short 16mm film exercise in color utilizing synchronous sound, with emphasis on observational filming techniques. Prerequisites: 223A, 224A. Corequisite: 223B.

5 units, Win (Krawitz)

224C. Documentary Film Production III—For graduate students. Final quarter of professional training in motion picture production. A five- to seven-minute, 16mm film utilizing skills acquired in 224A,B. Issues of documentary form and content. Prerequisites: 224A,B. Corequisite: 223C.

5 units, Spr (Staff)

225. Perspectives on American Journalism—Graduate section; see 125.

231. Media Ethics and Responsibility—Graduate section; see 131.

233. Communication and Culture—Graduate section; see 133.

236. Broadcast Journalism—Graduate section; see 136.

237. The National Information Infrastructure; U.S. Policy Debate—Graduate section; see 137.

240. History of American Journalism—Graduate section; see 140.

241A. History of Film: The First 50 Years—Graduate section; see 141A.

241B. History of Film: The Second 50 Years—Graduate section; see 141B.

242. Broadcasting in America—Graduate section; see 142.


4 units (Breitrose) not given 1997-98

250. Magazine Writing—Graduate section; see 150.

255. Interethnic Communication—Graduate section; see 155.

257. Public Communication Campaigns—Graduate section; see 157.

260. Political Communication—Graduate section; see 160.

266. Communication Policy in Comparative Perspectives—Graduate section; see 166.

269. Computers and Interfaces; Psychological and Social Issues—Graduate section; see 169.

270. Communication and Children—Graduate section; see 170.

272. Psychological Processing—Graduate section; see 172.

275. Reporting of Public Affairs—For graduate students. Coverage of traditional news beats, e.g., police, city hall, education, courts, and issue-oriented coverage of policy area beats. Prerequisite: consent of instructor.

5 units, Win (Maharidge)

276. International Communication—Graduate section; see 176.

277. Specialized Workshops—Graduate section; see 177.

277A. Opinion Writing
277B. Science Writing
277D. Environmental Reporting
277F. Feature and Analytical Writing
277G. Social Issues Reporting
277I. Specialized Reporting Course
277J. Specialized Reporting Course

278. Newsroom Management: Problems and Strategies in an Era of Change—Graduate section; see 178.

280. Film Criticism—Graduate section; see 180.
283. Media Economics—Graduate section: see 183.

290. A.M. Project
4-8 units, any quarter (Staff)

291. Graduate Journalism Seminar—Required of all A.M. journalism students. Discus- sions are devoted to preparation for the A.M. project and to current issues in the practice and performance of the press. Meets throughout the academic year.
  1 unit, Aut, Win, Spr (Bettinger)

292A, B, C. Documentary Film and Video A.M. Project Seminar—Discussions devoted to A.M. projects and to current issues in the practice and performance of documentary film and video production.
  8 units, Aut (Samuelson)
    Win (Breitrose)
    Spr (Krawitz)

299. Individual Work
1-4 units, any quarter (Staff)

PRIMARILY FOR DOCTORAL STUDENTS

301. Communication Curriculum Development and Pedagogy—Required of all second-year Ph.D. students.
  1-3 units, Aut (Nass, Reeves)

  1-3 units (Chaffee) not given 1997-98

311. Theory of Communication—Required of all communication doctoral students. Approaches to communication theory, seminar and tutorial meetings, and extensive reading and papers. Consent of instructor required for anyone not a Communication Ph.D. student.
  4-5 units, Aut (Chaffee)

313. Introduction to the use of the Computer—For science data analysis. Discussion of computing concepts, use of Wylbur and Edit, text editors on SCIP and LOTS systems; SPSS; and data storage.
  1-3 units (Staff) not given 1997-98

317. Doctoral Research Methods I—Prerequisite: Ph.D. admission in Communication.
  4 units, Win (Reeves)

318. Doctoral Research Methods II—Prerequisite: 317.
  4 units, Spr (Nass)

319. Doctoral Research Methods III—Prerequisite: 318.
  3-4 units, Win (Leets)

331G. Seminar in Communication/Media Ethics—Limited to Ph.D. students. Advanced topics in press ethics and responsibility. Prerequisite: 231 or consent of instructor.
  1-3 units (Glasser)
    alternate years, given 1998-99

333G. Seminar in Communication and Culture—Limited to Ph.D. students. Advanced topics in communication and culture. Prerequisite: 233 or consent of instructor.
  3-4 units (Glasser)
    alternate years, given 1998-99

355G. Seminar in Intergroup Communication—Limited to Ph.D. students. Advanced topics in intergroup communication. Prerequisite: 255 or consent of instructor.
  1-3 units (Leets)
    alternate years, given 1998-99

357. Public Information Programs—Doctoral section; see 157.

357G. Seminar in Media Campaigns—Limited to Ph.D. students. Advanced topics in public information programs. Prerequisite: 257 or consent of instructor.
  1-3 units (Staff) not given 1997-98

360G. Seminar in Political Communication—Limited to Ph.D. students. Advanced topics in political communication. Prerequisite: 260 or consent of instructor.
  1-3 units (Chaffee) not given 1997-98

365G. Interpersonal Communication—Limited to Ph.D. students. Prerequisite: consent of instructor.
  1-3 units, Spr (Leets)

369G. Seminar in Communication, Technology, and Society—Limited to Ph.D. students. Advanced topics in communication, technology, and society. Prerequisite: 269 or consent of instructor.
  1-3 units, Spr (Nass)

370G. Seminar in Communication and Children—Limited to Ph.D. students. Advanced topics in communication and children. Prerequisite: 270 or consent of instructor.
  1-3 units (Roberts) not given 1997-98

372. Advanced Communication Theory and Method Seminar in—May be repeated for credit. Topic and instructor change each year. Prerequisites: 311A, 319.
  1-3 units (Staff) not given 1997-98

372G. Seminar in Psychological Processing—Limited to Ph.D. students. Advanced topics in psychological processing. Prerequisite: 272 or consent of instructor.
  1-3 units, Spr (Reeves)

373G. Seminar in Communication and Health—Limited to Ph.D. students. Advanced topics in com-
communication and health. Prerequisite: 273 or consent of instructor.
1-3 units (Staff) not given 1997-98

374G. Seminar in Structure and Control of Communication—Limited to Ph.D. students. Advanced topics in structure and control of communication. Prerequisite: 273 or consent of instructor.
1-3 units (Glasser)

3 units (Staff)

376. Communication: History and Evolution of the Field—The history and current status of the field of communication research. Prerequisite: graduate standing in Communication.
3-4 units (Chaffee) not given 1997-98

3-6 units, Aut, Win, Spr (Staff)

378. Predissertation Research Project—Advanced research for Ph.D. candidates.
3-6 units, Aut, Win, Spr (Staff)

379. Advanced Individual Work 1-8 units, Aut, Win, Spr (Staff)

400. Dissertation Research 6-10 units, Aut, Win, Spr (Staff)

AFFILIATED DEPARTMENT OFFERINGS

See individual department offerings for course descriptions of the following, all of which are accepted for credit toward the communication major.

SLAVIC LANGUAGES AND LITERATURE

148. Totalitarian Cinema
3 units, Aut (Dobrenko)

OVERSEAS STUDIES

FLORENCE

51. Representations of Italy through the Eye of the Camera—(Same as Overseas Studies 132F.)
4 units, Aut (Campani)

52. Realism, Utopia, Myth, and Society in Italian Cinema: Bernardo Bertolucci, Pier Paolo Pasolini, and Federico Fellini
5 units, Win (Campani)

OXFORD

53. British Cinema and Society 1918-1940
4 units, Aut (Christie)

The interdisciplinary program in Comparative Literature (CL) admits students for the Ph.D. It works toward the Ph.D. in individual language departments and, in conjunction with the Humanities honors program, offers a concentration in comparative literature for undergraduates.

UNDERGRADUATE PROGRAM

BACHELOR OF ARTS

The undergraduate major in Comparative Literature is designed for students who combine the drive and ability to master foreign languages with a strong commitment to literary study. In all cases, students must do a substantial portion of their work in at least one foreign language. The major enables these students to pursue carefully constructed
programs of study involving the in-depth study of literature in one or more languages not their own; and the study of their literature of specialization, its theory, and its practice in relation to other literatures, communications media, and disciplines.

The major is distinguished from those in the national literatures by its comparative scope, by the requirement of seminars that focus on fundamental theoretical questions regarding the nature of literature and literary inquiry, and by its requirement that students’ programs of study be structured around the exploration of a single literary genre, historical epoch, or theoretical problem. It differs from the “interdisciplinary” majors in English and Modern Thought and Literature (MTL) by its requirement that every student’s program be anchored in the study of a literature other than that of his or her native language and, with specific regard to MTL, by its chronological scope.

The “comparative” aspect of each student’s program of specialization is fulfilled according to which of the two available tracks he or she elects to follow:

**Track A: The Literary Studies** track integrates in-depth work in a primary literature with extensive work in a second literature (in the original language) and complementary course work in an outside field.

**Track B: The Interdisciplinary** track integrates in-depth work in a primary literature with the focused study of literature in relation to other arts (music, painting, film, and so on), intellectual disciplines (philosophy, history, linguistics, anthropology, and so on), or comparative work in area studies.

An honors program is available in Comparative Literature for both of these tracks (see below) that integrates substantial in-depth work in a primary literature with extensive work in a second literature (in the original language) or discipline, but also requires the writing of a senior honors paper.

In both tracks, students work closely with the department’s Director of Undergraduate Studies in designing an individually tailored program of specialization involving two related areas of study. Individual study plans require considerable advance planning and must meet the approval of the Director of Undergraduate Studies.

**REQUIREMENTS**

**CORE FOR TRACKS A AND B**

All majors in Comparative Literature (CL) (including honors) are required to complete the following courses, the first as near as possible to the date of declaration and the second during the senior year. Together, these core seminars ensure that majors have been introduced to the framing propositions and principal methods of the discipline. More specifically these courses are designed to lead students to inquire about the historical standing of such concepts as the “literary,” the “aesthetic,” “criticism,” “genre,” “text,” and “theory.”

1. CL 101, Seminar on Literature and the Institution of Literary Study (5 units) provides students with an introduction to the comparative study of literature, to the history of poetic theory, and to the historical development of literary fields. It is concerned with addressing foundational questions such as: what kind of knowledge is literary knowledge and how has this knowledge been codified and categorized with respect to other forms of knowledge?

2. CL 199, Senior Seminar on Literary Theory (5 units) offers advanced students of comparative literature the opportunity for in-depth study of the evolution of modern literary theory and, particularly, of contemporary theoretical perspectives regarding the study of literary artifacts.

**TRACK A—LITERARY STUDIES**

Literary works are shaped by a complex interplay of historical forces and constraints, including contacts between differing cultures and traditions; the evolution of literary genres, practices, and conventions; shifts in media and technologies of reproduction and diffusion; and the imitation of model authors. By combining in-depth work in a primary literature with work in a second literature, this track emphasizes the study of such phenomena. It requires:

1. Courses using materials in the original language:
   a. Five of which make up an intellectually coherent program, in the literature of the first language A.
   b. Three are in the literature of language B. These course selections must be coordinated with the courses selected in the literature of language A in order that, taken together, they form a cohesive program of study focused upon one:
      1) a specific literary genre
      2) a historical epoch
      3) a theoretical question

   (Note: if either A or B is the student’s native language, further work must be done in a third language to the extent of at least one course in its literature. Literature courses usually begin after two years of college-level study. Bilingual students may count either tongue as “native” and the other as “acquired.” If language A, B, or C is Chinese, Japanese, Russian, or another language in which two years of language study does not constitute sufficient basis for literary study, some of the advanced work required for the major may be completed in
translation or fulfilled through work in an advanced language course. An appropriate program should be approved following consultation with the department's Director of Undergraduate Studies.)

2. Three cognate courses supplementing a student's work in the two chosen literatures and lending it further intellectual shape according to the criteria noted above. One course from the CL 100 series (but neither 101 or 199), or another course offered by the Department of Comparative Literature may be counted under this rubric.

3. One course, usually in translation, in a literature distant from the literatures of the student's concentration that can provide an "outside" perspective on the student's area of specialization.

4. Students in this track must also write at least one seminar paper that is comparative in nature. This paper should bring together material from courses taken in their primary and secondary literatures and may be an honors paper (see below), an individual research paper (developed through independent work with a faculty member, CL 198), or a paper integrating materials developed for two separate courses (by arrangement with the two instructors). It may be based on, though not identical to, a paper submitted for a requirement for a class. General guidelines for length require approximately 18-20 pages. The paper must be submitted to the Director of Undergraduate Studies and receive his or her approval no later than the end of Winter Quarter in the senior year of study.

TRACK B—INTERDISCIPLINARY

Literary creation is a complex human enterprise that intersects with a wide array of other fields of human endeavor and creation. Track B is designed to promote the focused study of intersections between literature and the arts (music, painting, film, and so on) other disciplines (philosophy, history, linguistics, anthropology, feminist studies, history of science, and so on) and area studies. It requires:

1. Five courses using materials in the original language, and making up an intellectually coherent program, in the literature of a language other than the student's native tongue. Bilingual students may satisfy this requirement in either of their original languages or in a third language.

2. Six courses (chosen as a function of the courses noted above) in:
   a) a single discipline or closely related cluster of disciplines
   b) the cultural history of a single historical epoch
   c) one or more of the fine arts; media or film studies
   d) area studies

   This course work must be shaped around the literature courses selected in item 1. It must either treat cogent analytical or thematic issues in the chosen discipline, or be directly relevant to the chosen historical specialization. Students who chose option "2d" must select courses that include work outside a single area studies focus or that have a genuinely comparative aspect. Each of these six courses must be approved in advance by the Director of Undergraduate Studies.

3. One course, usually in translation, on a literature distant from the two of the student's concentration. The intention here is, as above, to offer an "outside" perspective on the student's field of specialization.

4. Students in this track must also write at least one seminar paper that is interdisciplinary in nature. This paper should bring together material from courses taken in their primary literature and in another discipline and may be an honors paper (see below), an individual research paper (developed through independent work with a faculty member CL 198), or a paper integrating materials developed for two separate courses (by arrangement with the two instructors). Though it may draw on previous course work, the paper must be an original composition; general guidelines for length require 18-20 pages. It must be submitted to the Director of Undergraduate Studies and receive his or her approval no later than the end of Winter Quarter in the fourth year of study.

Students who choose the interdisciplinary option should be aware that it requires careful advance planning given that many course offerings are offered in alternate years.

Note—it is worth emphasizing that, as even a cursory review of the Stanford Bulletin demonstrates, this track in no way overlaps with current offerings in the modern language and literature departments whose majors neither require nor encourage students to pursue an integrated program of interdisciplinary study in tandem with their specialization in a national literature field. What it provides is an opportunity which is elsewhere unavailable to Stanford undergraduates: namely, a major analogous to the "English with an Interdisciplinary Emphasis" track in the Department of English, yet grounded in the study of non-English literature(s) and offering broad training in literary theory.

MINORS

The undergraduate minor in Comparative Literature (CL) represents an abbreviated version of the major. In all cases, students must do a substantial portion of their work in at least one foreign language.
All minors in Comparative Literature are required to complete CL 101, Seminar on Literature and the Institution of Literary Study (5 units). This provides an essential introduction to the framing propositions and principal methods of the discipline.

In addition, all minors must complete two courses in the literature of a language other than their native tongue. All materials in each course must be in the original language.

1. **Literary Studies Track:** integrates in-depth work in a primary literature with work in a second literature. Requirements are:
   a) Two courses in a second literature (this may include courses in translation, as well as courses in English and/or American literature).
   b) One additional course in Comparative Literature numbered 0-100

2. **Interdisciplinary Track:** integrates in-depth work in primary literature with the focused study of literature in relation to another art or intellectual discipline. Requirements are:
   a) Two courses in a single discipline, or the cultural history of a single historical epoch.
   b) One additional course in Comparative Literature numbered 0-100.

The minor is modeled primarily on the structure and progression of the major (with the appropriate reduction in course and unit requirements, as stipulated by the Committee on Undergraduate Studies). It retains the distinction between the two CL tracks and enables students to design a course of study built around the core CL seminar.

The Director of Undergraduate Studies is responsible for evaluating all requests and individual study plans for the minor.

**HONORS PROGRAM**

The honors option is reserved for exceptionally motivated students who wish to undertake an even more intensive and extensive program of study leading to the writing of a senior honors paper. The program allows for either a "Literary Studies" or an "Interdisciplinary" emphasis and it requires:

1. Six courses, using materials in the original language and making up an intellectually coherent program, in the literature of language A. For the interdisciplinary emphasis, these courses must be in the literature of a language other than the student's native tongue.

2. Emphasis:
   a) For a **Literary Studies Emphasis**, three courses using materials in the original language, in the literature of language B. (Note: Track A's rules regarding students' native languages, bilingualism, and special exemptions for students studying Chinese, Japanese, Russian, and so on, also govern students in the honors program who opt for a Literary Studies emphasis.) These course selections must be coordinated with the courses selected in the literature of language A in order that, taken together, they form a cohesive program of study focused on one of the following:
      1) a specific literary genre
      2) an historical epoch
      3) a theoretical question and three cognate courses that supplement a student's work in the two chosen literatures and lend it further intellectual shape. One course from the CL 100 series (but not 101 or 199) may be counted under this rubric.
   b) For an **Interdisciplinary Emphasis**: six courses as outlined in the general requirements for the Interdisciplinary Track (Track B), above. This course work must be shaped around the literature courses selected in item 1. It must either treat cognent analytic or thematic issues in the chosen discipline, or be directly relevant to the chosen historical specialization. Students who choose area studies for their interdisciplinary work must complete courses that include work outside a single area studies focus or that have a genuinely comparative aspect. Each of these six courses must be approved in advance by the Director of Undergraduate Studies.

3. One further course is required, usually in translation, on a literature distant from the two of the student's concentrations, so as to provide an "outside" perspective on the student's area of specialization.

4. During Spring Quarter of the junior year, a letter requesting admission to the honors program must be submitted to the department's Director of Undergraduate Studies. This letter must be accompanied by:
   a) the completed, signed worksheet
   b) an updated transcript
   c) a sample seminar paper
   d) an intended plan of study for the senior year (drawn up according to the emphasis selected)
   e) a preliminary statement (two to five pages) regarding the proposed topic of the honors paper (elaborated in consultation with the Director of Undergraduate Studies).
   (In Spring Quarter of junior year, the student may enroll for 2 units of credit for independent research in CL 194.)

This application is voted on by the Comparative Literature honors committee, made up of the Director of Undergraduate Studies and the chair of the Department of Comparative Literature. Should it be approved, a faculty tutor is appointed by the director according to the
topic. At the appropriate time, a second reader is designated by the honors committee.

5. Once the request for admission to the honors track has been approved, the student may choose to enroll in a 5-unit tutorial (CL 195, graded credit/no credit) with a faculty member during Autumn Quarter of the senior year in order to refine the project description, begin all necessary research, and initiate the composition of the honors paper.

6. During Winter Quarter of the senior year, the student must enroll in a 5-unit independent study (CL 195) with his or her faculty tutor for purposes of drafting the honors paper. At the end of the quarter, a completed draft must be submitted to the tutor. If it meets his or her approval as is, two copies must then be forwarded to the honors committee which will decide on the basis of the paper’s quality whether or not the student is awarded honors. If the faculty tutor feels that the paper still requires rewriting at the end of Winter Quarter, the student may enroll for 2 independent study units during Spring Quarter for purposes of final submission. In order to be considered for honors in Comparative Literature, two copies of the final paper must be submitted to the honors committee no later than the fifth week of Spring Quarter.

Honors papers vary considerably in length as a function of their topic, historical scope, and methodology. They may make use of previous work developed in seminars and courses, but must be of appropriate comparative or theoretical scope and should reflect the student’s chosen emphasis. Quality (not quantity) is the key criterion. As a rule of thumb, however, they run in the range of 40-70 pages.

Honors Awards — The two readers of any honors thesis in Comparative Literature may elect to nominate the thesis in question for University-wide awards if they feel that it is deserving. In addition, the department honors committee evaluates on a competitive basis the honors theses completed in a given year and nominates one for University-wide awards competitions.

Honors College — The Department of Comparative Literature encourages all honors students to enroll in the honors college scheduled during the weeks preceding the beginning of every academic year. Applications to the college are available from the department administrator. The department has traditionally run its honors college in collaboration with Humanities Special Programs.

Advising — When a student declares Comparative Literature, he or she may choose to declare the Director of Undergraduate Studies as his or her adviser, since the director approves credit for all course work (including course work abroad). The adviser may also be a member of the core Comparative Literature faculty. If this occurs, the student must meet periodically with the Director of Undergraduate Studies to monitor his/her progress in the major and for all questions regarding the major’s requirements.

Overseas Campuses and Abroad Programs — The Department of Comparative Literature encourages time abroad, both for increased proficiency in language and the opportunity for advanced course work. Course work done at campuses other than Stanford’s is counted toward the major at the discretion of the Director of Undergraduate Studies and is contingent upon the University’s acceptance of classes for units. To that end, students abroad must make an effort to save all notes, papers, correspondence, and so on, to increase the chance of acceptance.

Declaring the Comparative Literature Major — As soon as a student knows that he or she would like to declare the Comparative Literature major (and no later than Autumn Quarter of the junior year), he or she should obtain a worksheet for the appropriate track from the Comparative Literature office. The completed worksheet (with prospective courses for future years) should be handed to the Director of Undergraduate Studies with an updated official transcript and the student’s advising file. The director should sign the worksheet, indicating his or her approval of the feasibility of the proposed program. This worksheet needs to be updated at least once during each academic year.

GRADUATE PROGRAM

DOCTOR OF PHILOSOPHY

The Ph.D. program is designed for a small group of students whose linguistic background, breadth of interest in literature, and curiosity about the problems of literary scholarship and theory (including the relation of literature to other disciplines) make this program more appropriate to their needs than the Ph.D. in one of the individual literatures. Students take courses in at least three literatures (one may be that of the native language), to be studied in the original. The program is designed to encourage familiarity with the major approaches to literary study prevailing today.

Before starting graduate work at Stanford, students should have completed an undergraduate program with a strong background in one literature and some work in a second literature studied in the original language. Since the program demands an advanced knowledge of two non-native languages and a reading knowledge of a third non-native language, students should at the time of application have an advanced enough knowledge of one of the three to take graduate-level courses in that language when they enter the program. They should be making enough progress in the study of a second language to enable them to take gradu-
ate courses in that language not later than the beginning of the second year, and earlier if possible. Applicants are expected to take an intensive course in the third language before entrance.

A considerable part of a student's work consists of individual study toward the oral examinations, for which each student devises reading lists in consultation with the graduate adviser. These examinations are centered on the study of particular periods, genres, and problems of literary study.

Students are admitted under a fellowship plan which attempts to integrate financial support and completion of residence requirements with their training as prospective university teachers. Tenure as a fellow, assuming satisfactory academic progress, is for a maximum of four years, graduate-level work in literature completed elsewhere being counted as part of this four-year period. The minimum teaching requirement is the same regardless of financial support: (For specific teaching requirements, see below.) Although financial support is limited to four years, the completion of requirements often requires five years. Students in the fifth year ordinarily apply for outside fellowships or for part-time teaching positions in language and literature departments at Stanford.

APPLICATION PROCEDURES

Competition for entrance into the program is keen. The program is kept small so that students have as much opportunity as possible to work in individual projects under faculty supervision throughout the period of study. No more than 16 students are in residence at any one time. The department does not plan to admit more than three or four new students for the class entering in September. Completed applications are due January 1. Because of the special nature of comparative literature studies, the statement of purpose included in the application for admission should contain the following information besides the general plan for graduate work called for on the application:

1. A detailed description of the applicant's present degree of proficiency in each of the languages studied, indicating the languages in which the applicant is prepared to do graduate work at present and outlining plans to meet additional language requirements of the program.

2. A description of the applicant's area of interest (for instance, theoretical problems, genres, periods) within literary study and the reasons for finding comparative literature more suitable to his or her needs than the study of a single literature. Applicants should also indicate what they think will be their primary field.

All applicants should arrange to have the results of the general section of the Graduate Record Examination sent to the Department of Comparative Literature.

Recommendations should, if possible, come from faculty in at least two of the literatures in which the student proposes to work.

Applicants must submit a copy of an undergraduate term paper which they consider representative of their best work.

DEGREE REQUIREMENTS

Residence—A candidate for the Ph.D. degree must complete three years (nine quarters) of full-time work, or the equivalent, in graduate study beyond the A.B. degree. The student is expected to offer at least 72 units of graduate work in addition to the doctoral dissertation. At least three consecutive quarters of course work must be taken at Stanford.

Languages—Students must know three nonnative languages, two of them sufficiently to qualify for graduate courses in these languages and the third sufficiently to demonstrate ability to read a major author in this language. Only the third language may be certified by examination. The other two are certified by graduate-level course work specified below. Language preparation must be sufficient to support graduate-level course work in at least one language during the first year and in the second language during the second year. Students must demonstrate a reading knowledge of the third non-native language no later than the beginning of the third year.

Literatures made up of works written in the same language (such as Spanish and Latin American) are counted as one. One of the student's three literatures usually is designated as the primary field, the other two as secondary fields, although some students may offer two literatures at the "primary level" (six or more graduate courses).

Teaching—Fellows, whatever their sources of financial support, are ordinarily required to undertake a total of five quarters of supervised apprenticeships and teaching at half time. Fellows must complete whatever pedagogy courses are required by the departments in which they teach. The department's minimum teaching requirement is a total of three quarters.

Minimum Course Requirements—Students are advised that the range and depth of preparation necessary to support quality work on the dissertation, as well as demands in the present professional marketplace for coverage of both traditional and interdisciplinary areas of knowledge, render these requirements as bare minimum.

1. CL 369.

2. A sufficient number of courses (six or more) in the student's primary field to assure knowledge of the basic works in one national literature from its beginnings until the present.

3. At least two additional complementary courses, with most of the reading in the original, in each of two different national literatures. Stu-
Minimum course requirements must be completed before the student is scheduled to take the University oral examination. These requirements are kept to a minimum so that students have sufficient opportunity to seek out new areas of interest. A "course" is an offering of 3-5 units. Independent study may take the place of up to two of the required courses, but no more; classroom work with faculty and other students is central to the program.

Examinations—Three examinations are required. The third and last is the University oral examination. Students' reading lists for each examination must be approved by an examination committee and by the graduate adviser. The examinations consist of the following, each of which takes the form of an oral colloquy between the student and a committee of faculty members with interests in the subject areas:

1. First One-Hour Examination: on a literary genre, to consist of (a) a knowledge of a substantial number of literary works in a single genre, the list to include works from a number of centuries and from at least three national literatures, and (b) a grasp of the theoretical problems involved in dealing with this genre and with the question of genre in general. The examination must be taken no later than the beginning of the student's second year of graduate work (or the third quarter of the first year for students who enter with a year of previous graduate work).

2. Second One-Hour Examination: on literary criticism and theory, to consist of the exploration of a specific problem proposed and defined by the student. The problem must be sufficiently wide-ranging to demand the reading of critical texts from a variety of periods. The examination must be taken no later than the first quarter of the student's third year of graduate work (or the third quarter of the second year for students who enter with a year of graduate work). Students may elect to take this section of the examination before the genre section, in which case it must be taken at the earlier time.

3. University Oral Examination: on a literary period, to consist of in-depth knowledge of a period of approximately a century in three or more literatures with primary emphasis on a single national literature or, in occasional cases, two national literatures. The reading list covers chiefly the major literary texts of this period but may also include some studies of intellectual backgrounds and modern critical discussions of the period. Students must demonstrate a grasp of how to discuss and define this period as well as the concept of periods in general. This examination is not to be on the dissertation topic, on a single genre, or on current criticism but rather on a multiplicity of texts from the period. Students whose course work combines an ancient with a modern literature have the option of dividing the period sections into two wholly separate periods.

Qualifying Procedures—The qualification procedures for students in Comparative Literature take place during the quarter in which the student takes the first Ph.D. examination. Ordinarily, this is the beginning of the second year, but students who enter with a year of graduate work elsewhere must take the examination no later than the third quarter of the first year. Any student may elect to take the examination during the third quarter of the first year.

Students are judged qualified to proceed to the Ph.D. on the basis of the first part of Ph.D. examination as well as other aspects of their work (for example, performance in courses, ability to do original research) that predict strong promise for their dissertations and future careers as scholars and critics. As soon as the student has completed the qualifying procedures, the chair recommends him or her for admission to candidacy for the Ph.D. At this time the student is also recommended for the Master of Arts degree in Comparative Literature if he or she has completed 36 units of work at Stanford and has not already completed an A.M. before entering the program.

Colloquium—The colloquium normally takes place in the quarter following the University oral examination. The colloquium lasts one hour, begins with a brief introduction to the dissertation prospectus by the student lasting no more than five minutes, and consists of a discussion of the prospectus by the student and the three readers of the dissertation. At the end of the hour, the faculty readers vote on the outcome of the colloquium. If the outcome is favorable (by majority vote), the student is free to proceed with work on the dissertation. If the proposal is found to be unsatisfactory (by majority vote), the dissertation readers may ask the student to revise and resubmit the dissertation prospectus and to schedule a second colloquium.

The prospectus must be prepared in close consultation with the dissertation adviser during the months preceding the colloquium. It must be submitted in its final form to the readers no later than one week before the colloquium. A prospectus should not exceed ten double spaced pages, in addition to which it should include a working bibliography of primary and secondary sources. It should offer a synthetic overview of the dissertation, describe its methodology and the project's relation to prior scholarship on the topic, and lay out a complete chapter by chapter plan.
It is the student's responsibility to schedule the colloquium no later than the first half of the quarter after that quarter in which the student passed the University Oral Examination. The student should arrange the date and time in consultation with the department administrator and with the three examiners. The department administrator schedules an appropriate room for the colloquium.

Members of the dissertation reading committee ordinarily are drawn from the University oral examination committee, but need not be the same.

Ph.D. MINOR

This minor is designed for students working toward the Ph.D. in the various foreign language departments. Students working toward the Ph.D. in English are directed to the program in English and Comparative Literature described among the Department of English offerings. Students must have:

1. A knowledge of at least two foreign languages, one of them sufficient to qualify for graduate-level courses in that language, the second sufficient to read a major author in the original language.
2. A minimum of six graduate courses, of which three must be in the department of the second literature and three in the Department of Comparative Literature, the latter to include a seminar in literary theory or criticism. At least two of the three courses in comparative literature should originate in a department other than the one in which the student is completing the degree. Except for students in the Asian languages, students must choose a second literature outside the department of their major literature.

COURSES

Courses meeting Writing in the Major requirements are indicated by (WIM).

CORE

These courses are aimed at freshmen and sophomores who are non-majors (and/or potential majors) and provide an entry point to the discipline of Comparative Literature.

All majors are required, as soon as possible after declaration, to successfully complete CL 101. During the senior year, majors enroll in CL 199.

10N. Stanford Introductory Seminar: Egyptian East/Egyptian West—Preference to freshmen. Cultural comparisons engage the question of who "we" (making the comparison) are, and are linked with the construction of values. If Greek and Hebrew civilizations were seen as the foundation stones of "the West," then ancient Egypt was the common progenitor of both. Greeks and Hebrews targeted Egypt as the "Other" against which they defined themselves. "Egypt" is examined as constructed in the work of prominent Egyptologists through cosmical, ethical, philosophical, and imaginative texts left behind by the ancient Egyptians. Egypt as a reflection of contemporary attitudes about gender, language, and multiplicity.

3 units (Hare) given 1998-99

30N. Stanford Introductory Seminar: Opera and Literature—Preference to freshmen. Literary works that later became major operas (The Marriage of Figaro of Beaumarchais and Mozart, Othello of Shakespeare and Verdi, and Wozzeck of Buechner and Berg).

3 units, Spr (Lindenberger)

40N. Stanford Introductory Seminar: Fascism and Culture—(Same as French and Italian 40N.) Preference to freshmen. Interdisciplinary. Fascist and right-wing modernist cultural production in art, architecture, literature, and industrial design. The cultural, intellectual, and political pre-history and history of fascism in France, Germany, Italy, and Spain, emphasizing the connections and conflicts between totalitarian politics and modernist artistic forms.

3 units, Win (Gumbrecht)

50N. Stanford Introductory Seminar: Modern Stars and Medieval Saints—Preference to freshmen. "Charisma," why people fall in love with persons whom they will never meet personally, so much that they want to follow, pray to, embody, and sometimes even eat their idols. The role of the "Saint" and the role of the "Star," texts about saints and about stars, rituals surrounding saints and stars, with historically specific concretizations of charisma. The Virgin Mary (as a "mega-saint"), Marilyn Monroe, Charlemagne, Babe Ruth, Saint Elizabeth of Hungary, and Josephine Baker (others proposed by participants).

3 units, Spr (Schnapp)

60N. Stanford Introductory Seminar: Poetry and Literacy—Preference to freshmen. The earliest written documents in several cultures are poetic texts. What links poetic expression to the unchanging written letter? How might the two be seen as in conflict. The structure and transmission of non-literate poetry in several cultures (early Greece, early China, medieval Europe), and the ways in which writing bears on the speaking self, the notion of style and the history of texts. Readings in English: option of discussing original texts in other languages. Enrollment limited to 18.

3 units, Aut (Schnapp)

70N. Stanford Introductory Seminar: The Bible and World Culture—Preference to freshmen. The Bible is to many a little-known text, though it has been the foundation of major literary texts and political movements, art, and music. Its most influential portions are read, from Genesis through Apocalypse, and considered in relation to materials including literary excerpts, music from Handel to
reggae, anti-slavery and liberationist narratives, and the major speeches of Martin Luther King.

3 units, Win (P. Parker)

101. Seminar: Voice and Literature—Introduction to the comparative study of literature through voice and text. In the modern era, prose and poetry have drawn from the productive tension between the vital but ephemeral spoken word and the objectification of language in writing. The shifting relationship between these modes of expression and the changing representations of voice in text have defined forms of social and cultural identity (gender, race, class, nation), and the notion of literature itself. Concepts from theoretical readings are explored in active dialogue with literary texts from several national traditions and genres. (WIM)

3 units, Aut (Greenleaf)

115Q. Stanford Introductory Dialogue: Thinking in the Present—20th Century European Philosophy—Preference to sophomores. More than the Anglo-American (“analytic”) tradition which dominates in this country’s philosophy departments, European (“continental”) 20th-century philosophy has made the effort of thinking its/our own present and its existential, social, political consequences. The continental tradition has taken greater risks and probably accepted, in exchange, a lesser degree of rigor in its style of argumentation. Readings and discussion of four analyses of “present situations,” written (in different moments and from different angles) by continental philosophers: Martin Heidegger, Jean-Francois Lyotard, Juergen Habermas, and Gianni Vattimo. The continued viability (or non-viability) of concepts and patterns of thought in Western cultural and intellectual life (e.g., subjectivity, reason, knowledge, history).

2 units, Win (Gumbrecht)

140. Introduction to Film Study—(Same as Art 140.) The formal, historical, and cultural issues associated with the study of film. Familiar models of classical narrative cinema are juxtaposed with alternative narrative structures, documentary films, and experimental cinematic forms. Issues of cinematic “language,” visual perception, and representations of gender, ethnicity, and sexuality. Develops basic relevant aesthetic and conceptual analytical skills. Weekly screenings.

4 units, Aut (Bukatman)

141. Cinema and the City—(Same as Art 141.) Changing understandings of urban space over time are illustrated by reviewing a range of films from the past century. The cinematic city is an arena of social control, social liberation, collective memory and complex experience. Cinematic effects (montage, movement and subjective camerawork) are integral to understanding the city as a complex, lived environment. The rise and decline of the utopian precepts of architectural modernism and the representation of the city into the realm of cyber-space, where it still functions as a site of navigation, perception and self-redefinition. Weekly screenings. Recommended: 140 or its equivalent.

4 units, Win (Bukatman)

168. Introduction to Asian American Culture—Examination of Asian American cultural production (film, drama, poetry, fiction, music) in socio-historical context, with attention to the topics of ethnicity, race, class and gender, and the political economy of ethnic culture in the U.S. GER:4b (DR:3)

5 units, Aut (Palumbo-Liu)

194. Independent Research

1-5 units, Aut, Win, Spr (Staff)

195A,B,C. Honors—195A and B should total 10 units between the two quarters. 195B and C must be the same grade.

195A. Honors Research

0-10 units, Aut (Staff)

195B. Honors Thesis

0-10 units, Win (Staff)

195C. Honors Thesis

2 units, Spr (Staff)

199. Senior Seminar on Literary Theory—For senior Comparative Literature majors. The history, institutions, and methods of comparative literary study. Philological, archetypal, and historical criticism as represented by the work of Auerbach, Frye, and Spitzer, respectively. Rhetorical analysis (Booth, Ong, de Man), deconstruction (Derrida, de Man, Miller), body criticism (Foucault), gender theory (Butler), ethnic studies (Gates, Saldivar). Theoretical readings are supplemented with selections from the literary texts on which they focus (from Classical Greek and Latin, through medieval, Renaissance, and modern literatures). Works read in English translation.

5 units, Aut (Lerer)

202. Comparative Ethnic Autobiography—Comparative study of the formation and projection of an ethnic “self” as an act of differentiation, identification, and invention. How do different ethnic subjects, occupying different historical moments and with different notions of the personal and the political charge of self-narration, come to produce themselves? GER:4b (DR:3)

5 units, Spr (Palumbo-Liu)

204Q. Stanford Introductory Seminar: Ethnicity and Literature—Preference to sophomores. Introduction to the concept of ethnicity and the nature of literary form in this context through an examination of how people deemed “ethnic” have expressed social identities in literary texts. How does a “universal” form accommodate (or not) the specificities of ethnic experience? Novels by Cisneros, Paredes, Morrison, Baldwin, and Silko, with films and documentaries. GER:4b (DR:3)

3-5 units, Aut (Palumbo-Liu)
247. Seminar: Theories of the Moving Image—Cinema and Modes of Perception—(Same as Art 247.) Film theory emphasizes cinemas relation to human perception in the context of industrial, modern life. What are the implications of a medium similar to, but distinct from, human perception? As a medium insufficiently real or too immediate and palpable; as concrete perception or phantasmagoric vision, cinemas role in how we perceive, understand, and circulate through the world is open to debate. The mediums real-time aspects bring issues of performance into play. Theorists: Benjamin, Kraus, Epstein, Vertov, Eisenstein, Bazin, Cohn, Berber, Noh, Brakhage, Baudry, Mulvey, Deleuze. Screenings from narrative and non-narrative models. Enrollment limited to 20. Recommended: 140 or equivalent.

4 units, Win (Bukatman)

UNDERGRADUATE/GRADUATE

212. The History of Rhetoric—(Same as English 212.) The history of the discipline of rhetoric from Classical Greek and Latin traditions, through medieval, Renaissance, modern, and contemporary treatments. Schemes and tropes (Cicero and Quintilian); grammatical education and the schools (Geoffrey Vinsauf, John of Garland); Renaissance handbooks (Wilson, Puttenham); 18th- and 19th-century oratory; current appropriations (e.g., Paul de Man, deconstruction). Texts are read for their deployments of rhetorical devices and their thematic attention to verbal organization (e.g., selections from the Aeneid, medieval lyrics, Chaucer's Canterbury Tales, Shakespeare's Hamlet, Augustan and Romantic Poetry, 19th-century prose fiction). Modern English translations; some emphasis to original-language texts of earlier periods.

3-5 units, Win (Lerer)

215. Psychoanalysis and Literature: Institutions of Seduction—Examination of the claim that literature is a privileged institution of seduction and initiation into ways of knowing and forms of desire. The conceptual foundations of fantasy in psychoanalytic theory. Scenes of initiation, the formation of identity in gender and sexuality, and a questioning of the role played by literature in the assumption of the identities tracked in these texts.

3-5 units, Win (Al-Kassim)

220. Islam and Post-Coloniality—Issues in the effort to define post-colonial Islamic culture: Islamic modernity, feminism, hybridity, and the pervasive trope of cultural decadence. The Arabic responses to the Rushdie fatwa, Laouris' charge of a "crisis" in Arabic cultural life, the legacy of colonialism, problems of immigration and the veil. Texts from Arabic literature, and the work of major intellectuals.

3-5 units, Spr (Al-Kassim)

252E. Languages, Structures, and Societies: An Introduction to Structuralism—(Same as French and Italian 252E.) Analysis of the background and basic concepts of structuralism. Readings: Ferdinand de Saussure, Course in General Linguistics; Roland Barthes, Elements of Semiology; Lévi Strauss, Mythologiques, and from George Dumézil, Luc de Heush, and Edmund Leach.

3-5 units, Win (Mudimbe)

259E. Paradigms of Modern Thought: Michel Foucault and the Archeology of Knowledge—(Same as French and Italian 259E.) Introduction to Michel Foucault's theses and methods and their significance for the individuation and the specification of each culture and individual. Readings: main texts by Foucault and excerpts from Georges Guillaume, George Dumezil, and Jean Hyppolite.

3-5 units, Win (Mudimbe)

263B. Seminar: Psychoanalytic Perspectives on Art and Literature—(Enroll in Art 263.)

4 units, Aut (Spitz)


5 units, Win (Palumbo-Liu)

278E. Topics in French and Francophone Literature: Discourse on Self-Representation—(Enroll in French and Italian 278E.) Critical analysis of major issues relating to literatures in French and outside France, focusing on Negritude and Surrealism, the question of the Other, and the problematic of Identity. Readings: Césaire, Nédé, Jean Hyppolite, Sartre, Barthes, and Todorov.

3-5 units, Spr (Mudimbe-Boyi)

282E. Revisiting May 1968: Contexts of a "Revolutions" that came from the Universities—(Same as French and Italian 282E.) Culminating in a challenge of the State which, in May 1968, pushed Paris to the verge of a civil war, the mid-1960s in the U.S., France, and Germany were a time of political critique and cultural productivity. This originated among university students and continued unfolding and transforming itself at the universities. "A utopian cultural revolution," the events preceding and following May 1968 are not settled in an established paradigm of interpretation, and are forgotten among younger generations. Analysis of original documents, and contact with historical witnesses, reconstructs and rethinks the "Students' Revolution."

3-5 units, Win (Apostolidis, Gumbrecht)

284E. Women Writing in French: A Cross Cultural Perspective—(Enroll in French and Italian
Focuses on the topics of exile (geographical, cultural, or psychological), marginalization, and transgression as metaphors of women's condition in different cultures and societies within the Francophone world (France, Africa, Caribbean, and the Middle East). Emphasis is on how female subjectivity is recast through narrative modes, choice of literary conventions and genres, with a discussion of the validity of Euroamerican feminist theories and assumptions when applied to different cultural contexts. Readings: Warner-Vieyra, Djebar, Accad, Liking, El Sadawi, Condé, etc. Films and videos.

3-5 units, Win (Mudimbe-Boyì)

305C. Colloquium: Literature and Institutions—(Same as English 305C.) Theoretical investigation with practical examples of authorship, readership, evaluation, and the production and dissemination of literary texts from various historical periods.

4-5 units, Win (Lindenberger)

314. Seminar: Epic and Empire—Focusing on Virgil's Aeneid and its influence, traces the European epic tradition (Ariosto, Tasso, Camões, Spenser, and Milton) to New World discovery and mercantile expansion in the early modern period.

5 units, Win (P. Parker)

369. The Disciplines of Comparative Literature—Introduction to the history, structure, and intellectual debates of the discipline of comparative literature. The origins of comparative literature in the study of philology and the institutions of the European university. Key theoretical moves that shaped literary theory, criticism, and history in America: semiotics and structuralism, deconstruction and poststructuralist critiques, the renewed interest in the rhetoric and rhetorical reading, identity politics, and ethnic studies, views of the literary canon and the impact of cultural studies.

5 units, Aut (Lerer, Schnapp)

370. The Anthropology of Speed—(Same as French and Italian 370E.) A dialogue between the history of technology and cultural history (art, music, literature, film), seminar examines the formative impact of themes of speed, acceleration, intensification on modern notions of experience, subjectivity, signification, power, and production. Topics: 18th-century coaching and the rise of amateur coaching; the rise of sporting and racing subcultures and sporting media during the early 19th century; psycho-physical theories of thrill and shock; exercise and hygiene from the fin de siècle to the present; scientific management and the world of work; bodies and machines; cognitive and perceptual ramifications of aviation, mechanized ground transportation, film, and video; velocity, addiction, entertainment, and ennui. Authors: De Quincey, Marinetti, Virilio, Ballard.

5 units, Aut (Schnapp)

395. Independent Study—Preparation for qualifying examination and for the Ph.D. oral examination.

1-15 units, any quarter (Staff)

399. Dissertation

1-15 units, any quarter (Staff)

395A. Philosophical Reading Group—Close reading of classical and contemporary texts from the Western philosophical tradition.

2-3 units, Aut, Win, Spr (Gumbrecht)

RELATED OFFERINGS

Courses primarily of a comparative nature are listed below.

ASIAN LANGUAGES

55/155. Screening Modern China: Chinese Film and Culture

4 units, Spr (Chow)

120. The "Boudoir" and the Frontier

4 units, Win (Egan)

137. Japanese Fiction in Translation

4 units, Aut (Bolton)

CLASSICS

166. Classical Influences on Modern Literature

3-5 units, Spr (Wigodsky)

169. Introduction to the Ethics of Socrates, Plato, and Aristotle

4-5 units, Win (Nightingale)

ENGLISH

150. Poetry and Poetics

5 units, Win (Boland)

154A,B. British Romanticism and Literary Modernity, Parts 1 and 2

5 units, Aut, Win (Kaufman)

157. 20th-century Poetry and Philosophy

5 units, Win (Bourbon)

158. French and American Symbolist Poetry

5 units, Win (Fields)

162G. Writing by 20th-century Women of Color

5 units, Win (Moya)

163C. Chicana Writers

5 units, Spr (Romero)

163G. Literary and Visual Culture in 18th-century Britain

5 units, Aut (Harkin)

164B. Imagining the Holocaust

5 units, Spr (Felstiner)

166D/266D. Introduction to Critical Theory: Literary Theory since Plato

5 units, Aut (Kaufman)
188. Seminar: Poetry and Poetics  
5 units, Aut (Di Piero)  
Spr (Felstiner)  

293. Seminar in Literary Translation  
4-5 units, Win (Felstiner)  

302C. Colloquium: The Invention of the Great Book in the Renaissance  
4-5 units, Aut (Orgel)  

4-5 units, Win (Kaufman)  

FRENCH AND ITALIAN  

133E. Literature and Society: Introduction to Francophone Literature from Africa and the Caribbean  
4-5 units, Win (Mudimbe-Boyi)  

166E. Women's Voices in Contemporary Italian Literature  
4 units, Aut (Springer)  

191E. Women in Italian Cinema  
4-5 units, Spr (Campani)  

192E. Images of Women in French Cinema: 1930-1990  
3-5 units, Spr (Apostolides)  

208E. Female Saints  
4 units, Aut (Cazelles)  

214E. Images of the Afterlife  
4-5 units, Spr (Harrison)  

223E. Literature and Psychoanalysis  
3-5 units, Spr (Hullot-Kentor)  

224E. Psychoanalytic Theory of Femininity  
3-5 units, Aut (Hullot-Kentor)  

247E. Fictions of the Self: First Person Narration in Modern Europe  
3-5 units, Win (Landy)  

254E. Introduction to French Philosophy: From 1943 to the Present  
3-5 units, Spr (Dupuy)  

263E. Love Books of the Middle Ages  
4-5 units, Win (Harrison)  

267E. 20th-Century Italian Poetry and the Experience of the War(s)  
4-5 units, Spr (Campani)  

GERMAN STUDIES  

241-243. The history of German thought from 1750 to the present and its significance for an understanding of modern culture. Authors: Lessing, Herder, Kant, Schiller, Hegel, Marx, Nietzsche, Lukacs, Husserl, Heidegger, Adorno, Habermas.  

241. Deutsche Geistesgeschichte I: 18th-Century Thought  
3-5 units, Aut (Strum)  

242. Deutsche Geistesgeschichte II: 19th-Century Thought  
3-5 units, Win (Strum)  

243. Deutsche Geistesgeschichte III: 20th-Century Thought  
3-5 units, Spr (Heins)  

233/333. The Early Humoristic Novel  
3-5 units, Spr (Gillespie)  

277. Faust—Goethe's Faust, with classical and contemporary criticism. Readings/discussion primarily in German.  
3-5 units, Aut (Berman)  

296/396. Literature of Decadence  
3-5 units, Spr (Gillespie)  

HISTORY  

306A. Graduate Colloquium: The Modern Tradition—Capitalism, Imperialism, and their Critics  
4-5 units, Aut (Beinin)  

HUMANITIES  

194M. Being and Time in the Novels of Milan Kundera  
5 units, Aut (Moeller-Sally)  

MODERN THOUGHT AND LITERATURE  

191. Topics in American Comic Performance: Laughter about Identity, Class, Race, and Gender from Royall Tyler to Richard Pryor  
5 units, Win (Obenzinger)  

213. Family Dynamics in Literature  
3 units, Spr (Van Natta)  

SLAVIC LANGUAGES  

45/145/245. The Age of Experiment (1820-1840)  
4 units, Aut (Greenleaf)  

46/146/246. Violence and the Sacred in the Russian Novel: War and Peace, The Brothers Karamazov  
3-4 units, Win (Moeller-Sally)  

47/147/247. Russian Literature and Culture in the 20th Century  
3-4 units, Spr (Fleishman)  

161/261. Poetess: The Grammar of the Self when the Poet is a Woman  
4 units, Win (Greenleaf)  

SPANISH AND PORTUGUESE  

298. Senior Seminar: PanAmerican Movement  
3-5 units, Win (Fox)  

307. Latin American Cultural Theory—Introduction to recent works in cultural theory and cultural studies in Latin America. Topics: popular cultures and modernity, the semiotics of the author-
iarian state, Latin American postmodernism, the megalopolis, indigenous peoples, and the renegotiation of the national.

3-5 units (Pratt)

SPECIAL LANGUAGE PROGRAM

125A, C, D. Topics in Arabic Literature and Culture—Designed to be taken independently; not a sequence.
125A. The Contemporary Arabic World and Culture through Literature
   4 units, Aut (Barhoum)
125C. Contemporary Arab Women Writers and Issues
   4 units, Win (Barhoum)
125D. Arab World through Travel Literature
   4 units, Spr (Barhoum)

OVERSEAS STUDIES

These courses are approved for the Comparative Literature major and taught overseas at the campus indicated. Students should discuss with their major advisers which courses would best meet individual needs. Descriptions are in the “Overseas Studies” section of this bulletin, or at the Overseas Studies Office, 126 Sweet Hall.

BERLIN

98. Egypt in the German Imagination
   4 units, Aut (Hare)
99. Comparative Cultural Interaction: Japan/America, Germany/America
   3 units, Aut (Hare)

FLORENCE

251. F. T. Marinetti and Futurism
   units by arrangement, Win (Schnapp)

COMPARATIVE STUDIES IN RACE AND ETHNICITY (CSRE)

Director: Albert Camarillo
Steering Committee: Albert Camarillo (History), Gordon Chang (History), George Fredrickson (History), Morris Graves (African and Afro-American Studies), Teresa Lariat (Education), Ramón Saldivar (Vice Provost for Undergraduate Education and Associate Dean of Humanities and Sciences), Claude Steele (Psychology), Yvonne Yarbro-Bejarano (Spanish and Portuguese), Steven Zipperstein (History)

Affiliated Faculty: David Abernethy (Political Science), Lucius Barker (Political Science), Joel Beinin (History), Rudy Busto (Religious Studies), Albert Camarillo (History), Martin Carnoy (Education), Clayborne Carson (History), Gordon Chang (History), George Collier (Anthropology), Larry Cuban (Education), Arnold Eisen (Religious Studies), Harry Elam (Drama), Roberto Fernandez (Sociology), Claire Fox (Spanish and Portuguese), Luis Fraga (Political Science), George Fredrickson (History), Estelle Freedman (History), Joan Fujimura (Anthropology), Akhil Gupta (Anthropology), Kenji Hakuta (Education), Janet Halley (Law), Shirley Heath (Linguistics), Sharon Holland (English), Terry Karl (Political Science), Roy King (Psychiatry), Jan Krawitz (Communication), Teresa Lariat (Education), Sam LeBaron (Family Medicine), Laura Leets (Economics), Henry Levin (Education), Yvonne Maldonado (Pediatrics), Purnima Mankekar (Anthropology), Hazel Markus (Psychology), Raymond McDermott (Education), Paula Moya (English), Norman Naimark (History), Daniel Okimoto (Political Science), Susan Olzak (Sociology), Amado Padilla (Education), David Palumbo-Liu (Comparative Literature), Mary L. Pratt (Spanish and Portuguese), Felicia Pratto (Psychology), John Rickford (Linguistics), Cecilia Ridgeway (Sociology), Richard Roberts (History), Aron Rodrigue (History), Lora Romero (English), Renato Rosaldo (Anthropology), Ramón Saldivar (English), Stephen Sano (Sociology), Debra Satz (Philosophy), Karen Sawislak (History), Anna D. Smith (Drama), C. Matthew Snipp (Sociology), Claude Steele (Psychology), Michael Thompson (History), David Tyack (Education), Guadalupe Valdés (Education), Robert Warrior (English), Carolyn Wong (Political Science), Sylvia Yanagisako (Anthropology), Yvonne Yarbro-Bejarano (Spanish and Portuguese), Steven Zipperstein (History)

Affiliated Lecturers: Todd Benson (History), Roy Lukose (Anthropology), Sharon Nelson-Barber (Anthropology), Usha Welaratna (Anthropology)

UNDERGRADUATE PROGRAMS AND MAJORS

CORE CURRICULUM

The Interdisciplinary Program in Comparative Studies in Race and Ethnicity (CSRE) provides students the opportunity to structure a major or minor in comparative ethnic studies or to focus their course work in a single ethnic studies area. Four new majors and minors (Asian American Studies, Comparative Studies, Chicano/a Studies, and Native American Studies) are offered as part of CSRE. All courses taken for the major must be taken for letter grade. In addition, the existing Program in African and Afro-American Studies and the Program in Jewish Studies are affiliated with the new majors.
Students who declare any of the four new majors participate in a common curriculum of the CSRE consisting of at least two introductory “core” courses and a senior seminar. Students who declare the major in African and Afro-American Studies beginning Autumn Quarter 1997 enroll in this core curriculum. Individually designed majors in Jewish Studies may also enroll in the CSRE core curriculum.

MINORS
Students who wish to minor in the new study areas must complete six courses (a minimum of 30 units) from the approved CSRE course list, two of which must be introductory “core” courses. Proposals for the minor must be approved by the chair or curriculum of each study area.

HONORS
Majors in each of the study areas who meet academic qualifications (at least a grade of ‘B+’ in CSRE-related courses) may apply for admission. Majors may participate in summer programs to facilitate their honors thesis research. Prizes for the best undergraduate honors theses are awarded annually by the Faculty Steering Committee of CCSRE.

AFRICAN AND AFRO-AMERICAN STUDIES (AAAS)
Acting Director: Morris Groves

Beginning 1997-98, AAAS is a CSRE-related major. For major and minor descriptions and requirements, see the “African and Afro-American Studies” section of this bulletin.

ASIAN AMERICAN STUDIES
Chair: Gordon Chang

Asian American Studies (AAS) provides an interdisciplinary approach to understanding the historical and current experiences of persons of Asian ancestry in the United States. In using the term “Asian American,” the AAS faculty recognizes that the term seeks to name a rapidly developing, complex, and heterogeneous population and that there is neither a single Asian American identity nor one “community” that comprises all Asian Americans. Asian Americans include those with ancestral ties to countries or regions in East Asia, South Asia, Southeast Asia, or the Philippines, among others.

AAS brings together courses that address the social, political, historical, humanistic, and artistic dimensions of Asian Americans and is an appropriate course of study for students interested in a variety of concerns related to Asian Americans, including: historical experiences, immigration, current social significance, policy issues, intellectual, artistic and cultural contributions, relationships with other social groups, and the construction of “Asian American” as it addresses important theoretical and practical issues.

REQUIREMENTS
AAS offers undergraduates opportunities for either a major or a minor. In addition to the 15 units in the CSRE core curriculum, 45 units are distributed as follows: 5 units in a course with an international dimension; 30 units in Asian American focus courses selected from among historical studies, social sciences, and humanities; and 10 units in courses offering comparative perspectives. In certain instances, students are able to apply credit from the study of an Asian language to help meet requirements and receive a special citation for relevant language study. For students already fluent in an Asian language, the citation may also be earned by using the language in a substantial way in the research for their senior papers. An honors option is available. Minors take 30 units in a program of study similar in form to that of majors.

Students interested in the major or minor in AAS work with a faculty adviser to develop a specific program of study. The proposal must be approved by the chair of AAS. Policies and programming for the new major and minor are guided by the Asian American Studies Curriculum Committee.

CHICANA/O STUDIES
Chair: Yvonne Yarbro-Bejarano

Chicana/o Studies is an interdisciplinary major focusing on the Mexican-origin population of the U.S., the second largest ethnic group in the nation. Students who major or minor in Chicana/o Studies have an opportunity to select from a wide variety of courses in the humanities and social sciences as well as selected courses offered by affiliated faculty in the School of Education. In addition to the CSRE introductory “core” courses, students who major and minor in Chicana/o Studies are required to enroll in the Introduction to Chicana/o History and Culture survey course.

REQUIREMENTS
Together with their faculty mentors, majors design a thematic concentration consisting of eight courses (40 units). The substantial number of courses available across the disciplines permit majors to develop unique and innovative thematic concentrations. Students also have opportunities to participate in public service-learning internships related to their academic course of study. The Chicana/o Studies Curriculum Committee approves applications for majors and minors and reviews proposals for the honors program.

A “Spanish Language Proficiency Option” is offered to majors interested in using Spanish in their course work or for their research. This option, modeled on programs of foreign language
The thematic course of study developed by CSRE majors must be approved by the CSRE chair and by the CCSRE Faculty Steering Committee. Proposals for the minor and admission to the CSRE honors program must be approved by the chair. The policies and programs for the major and minor are guided by the Subcommittee on the Curriculum of the CCSRE Faculty Steering Committee.

PROGRAM IN JEWISH STUDIES

Chair: Aron Rodrigue

Jewish Studies is an affiliated program of CSRE. For program and course descriptions see "Jewish Studies" section of this bulletin.

NATIVE AMERICAN STUDIES

Chair: Teresa Lafromboise

Native American Studies provides an intensive approach to understanding the historical and contemporary experiences of Native American people. Attention is paid not only to the special relationship between tribes and Federal government but issues across national boundaries, including tribal nations within Canada, and North, Central, and South America. In using the term "Native American," the NAS faculty recognizes the heterogeneous nature of this population. Native Americans include the Alaska Native population, which comprises Aleuts, Eskimo, and other Native American people residing in Alaska.

The purpose of the Native American Studies major and minor is to introduce students to a broad range of approaches in the academic study of Native American people, history, and culture. Students who major in Native American Studies have the opportunity of doing advanced work in a number of related fields, including literature, sociology, education, and law. In addition to specialized course work on Native American issues, students also are expected to concentrate in a traditional discipline such as history, anthropology, or psychology to ensure they have a well rounded educational experience. The area of concentration and related course work should be selected in consultation with an faculty adviser in Native American Studies. All courses in the program in some way promote the ongoing discussion of how academic knowledge about Native Americans relates to the historical and contemporary experiences of Native American people and communities.

REQUIREMENTS

NAS offers undergraduates opportunities for either a major or minor. The major requires 60 units of course work. In addition to the 15 units of CSRE core courses, 45 units are distributed as follows: 30 units in Native-American focus courses selected from among humanities and social sciences;
5 units in a course devoted to the methodologies, theories, or field research in a particular area of study; and 10 units in courses offering comparative perspectives. Students may acquire credit from a service-learning internship option. Minors take 30 units in a program of study similar in form to that of majors.

**COURSES**

**CORE**

**ANTHROPOLOGY**

151B. Theories of Race and Ethnicity: A Comparative Perspective—(WIM)  
5 units, Win (Yanagisako)

**COMPARATIVE LITERATURE**

202. Comparative Ethnic Autobiography  
5 units, Spr (Palumbo-Liu)

**HISTORY**

164. Introduction to Race and Ethnicity in the American Experience—(WIM)  
5 units, Spr (Camarillo, Fredrickson)

**SPANISH**

169E. Cultural Dimensions of Globalization  
3-5 units, Win (Fox)

**THEMATI C**

**AFRICAN AND AFRO-AMERICAN STUDIES**

105. Introduction to African and Afro-American Studies  
5 units (Staff)

**ANTHROPOLOGY**

104. Language, Culture, and Education in Native America  
5 units, Spr (Nelson-Barber)

110B. Disrupting the Border: Mexican Migration and the Reconceptualizations of Latin American and Chicano Studies  
5 units, Win (DeGenova)

131. The South Asian Diaspora: Colonial and Postcolonial Relocations  
5 units, Aut (Lukose)

5 units, Spr (Welaratna)

157A. Racialization and the Politics of Culture  
5 units, Spr (DeGenova)

157B. The Cultural Politics of Social Reproduction: Youth/Gender/Class/Race  
5 units, Win (Lukose)

163A. Ethnic and National Identities  
5 units, Win (Ssorin-Chaikov)

5 units, Spr (DeGenova)

244A. Naturalizing Power: Kinship/Gender/Race/Sexuality  
5 units, Win (Yanagisako)

251B. Cultural Citizenship  
5 units, Aut (Rosaldo)

**COMMUNICATION**

155. Interethnic Communication  
4 units, Win (Leets)

**COMPARATIVE LITERATURE**

168. Introduction to Asian American Culture  
5 units, Aut (Palumbo-Liu)

204Q. Stanford Introductory Seminar: Ethnicity and Literature  
3-5 units, Aut (Palumbo-Liu)

**DRAMA**

43. Afro-Brazilian and Afro-Peruvian Dance  
1 unit, Aut (Cashion)

143. African-Caribbean Roots of American Jazz Dance  
2 units, Win (Moses)

**EDUCATION**

177X. Education of Immigrants in Cities  
4 units, Win (Padilla)

193B. Peer Counseling: Chicano Community  
2 units, Aut, Spr (Martinez)

193C. Peer Counseling: The African American Community  
2 units, Aut (Edwards, Reede-Hoskins)

193F. Peer Counseling: The Asian American Community  
2 units, Aut (Wang)

193N. Peer Counseling in the Native American Community  
2 units, Spr (Staff)

251X. Language and Ethnicity  
4 units, Win (Fishman)

283. Attitudes towards Languages and Language Study  
4 units, Spr (Padilla)

306C. Cultural Approaches to Technological Innovation and Learning  
5 units, Spr (McDermott)
340X. Psychology and American Indian Health
5 units (Lafromboise) not given 1997-98

388A.B. Bilingual Education
388A. 3-4 units, Spr (Hakuta)
388B. 3 units, Win (Hakuta)

ENGLISH

124C. Introduction to Chicano History and Culture—(Same as History 162.)
5 units, Aut (Camarillo, Moya)

161A. Afro-American American Writing, 1950-1970
5 units, Spr (Drake)

162G. Writing by 20th-Century Women of Color
5 units, Win (Moya)

163C. Chicana Writers
5 units, Spr (Romero)

164B. Imagining the Holocaust
5 units, Spr (Felstiner)

168A. Introduction to American Indian Studies
5 units, Aut (Camarillo, Moya)

187N. Seminar: Afro-American Autobiography
5 units, Aut (Porter)

HISTORY

22N. Stanford Introductory Seminar: Ethnic Cleansing in 20th-Century Europe
5 units, Win (Naimark)

505. Sources and Methods Seminar: Race and Popular Culture (in Black and White)
5 units, Spr (Thompson)

61. The Constitution and Race
5 units, Spr (Rakove)

85Q. Stanford Introductory Seminar: Jews and Muslims
5 units, Spr (Rakove)

137. The Holocaust
5 units, Aut (Rodrigue)

150. African-American History—African Origins to American Emancipation and Beyond
5 units, Win (Thompson)

5 units, Spr (Carson)

159. Introduction to Asian American History
4-5 units, Aut (Chang)

162. Introduction to Chicano History and Culture—(Same as English 124C.)
5 units, Aut (Camarillo, Moya)

247. Greater East Africa and its Historical Writing
5 units, Aut (Jackson)

248A. Undergraduate Colloquium: The End of Slavery in Africa and the Americas
5 units, Win (Roberts)

251A.B. Undergraduate Colloquium: Poverty and Homelessness in America
5 units (Camarillo) not given 1997-98

253. Undergraduate Colloquium: Topics in African-American History—The Great Migration
5 units, Spr (Thompson)

255A. Undergraduate Colloquium: Culture and Ideologies of Race
5 units, Aut (Thompson)

259. Undergraduate Colloquium: Race and Ethnicity in the U.S. and South Africa
5 units, Aut (Fredrickson)

265. Undergraduate Colloquium: New Research in Asian American History
5 units, Spr (Chang)

269. Undergraduate Colloquium: The African-American Organizing Tradition
5 units, Aut (Carson)

271. Undergraduate Colloquium: The History of American Indians since 1934
5 units, Aut (Benson)

LINGUISTICS

73. African American Vernacular English
4 units, Win (Baugh)

150. Language in Society
4-6 units, Aut (Schillin-Estes)

MUSIC

1B. Talk about Music: Identity, Meaning, and Practice
3 units, Spr (McMichael)

16Q. Stanford Introductory Seminar: Ki hō'alu—The New Renaissance of Hawaiian Musical Tradition
3 units, Aut (Sano)

20A. Jazz Theory
3 units, Win (Nadel)

111. Seminar in North American Taiko
4 units, Spr (Sano, Staff)

118B. The Struggle Continues: Jazz, Culture, and Society
5 units, Win (McMichael)

PHILOSOPHY

177. Philosophical Issues Concerning Race and Racism
4 units, Win (Satz)

POLITICAL SCIENCE

104. Seminar: Urban Policy
5 units, Win (Fraga)
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<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Units</th>
<th>Term</th>
<th>Instructor</th>
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<tr>
<td>181.</td>
<td>African-Americans and the Political System</td>
<td>5</td>
<td>Spr (Harris)</td>
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<td>186.</td>
<td>Urban Politics</td>
<td>5</td>
<td>Win (Fraga)</td>
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<td>Political Economy of Immigration</td>
<td>5</td>
<td>Spr (Wong)</td>
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<td>196.</td>
<td>Issues of Race in American Politics</td>
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<td>Seminar: Ethnicity and Nationalism in Soviet and Post-Soviet Politics</td>
<td>5</td>
<td>Win (Lapidus)</td>
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<td>Seminar: Racial and Ethnic Politics in the U.S.</td>
<td>5</td>
<td>Spr (Fraga)</td>
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<td><strong>PSYCHOLOGY</strong></td>
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<td>160.</td>
<td>Culture and Self</td>
<td>3</td>
<td>Win (Markus)</td>
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<td>161.</td>
<td>Cultural Psychology</td>
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<td>African American Psychology</td>
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<td>Spr (McCants)</td>
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<td>Seminar on Topics in Identity Development</td>
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<td>Win (McCants)</td>
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<td>23.</td>
<td>Introduction to Judaism</td>
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<td>Win (Lawee)</td>
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<td>143.</td>
<td>Chicano/a Religious Traditions</td>
<td>4</td>
<td>Spr (Busto)</td>
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<td><strong>SOCIOMETRY</strong></td>
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<td>120.</td>
<td>Interpersonal Relations</td>
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<td>Aut (Ridgeway)</td>
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<td>American Indians in Comparative-Historical Perspective</td>
<td>5</td>
<td>Win (Snipp)</td>
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<td>139.</td>
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<td>312A,B,C</td>
<td>Workshop: Ethnic Collective Action</td>
<td>5</td>
<td>Aut, Win, Spr (Olzak)</td>
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<td><strong>SPANISH</strong></td>
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<td>131.</td>
<td>Spanish American Cultural Perspectives</td>
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<td>Aut (Ferdinan)</td>
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<tr>
<td>132.</td>
<td>Mexican and Chicano Cultural Perspectives</td>
<td>4</td>
<td>Win (Staff)</td>
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<td>207.</td>
<td>Theory and Issues in the Study of Bilingualism</td>
<td>4</td>
<td>Aut (Valdés)</td>
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<td>Puerto Rican Literature: The Elusive Nation</td>
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<td>Win (Yarbro-Bejarano)</td>
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<td>342.</td>
<td>Constructors of Race in 19th-Century Latin America</td>
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<td>Aut (Rosa)</td>
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<td>389.</td>
<td>Queer Raza</td>
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<td>Aut (Yarbro-Bejarano)</td>
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<td><strong>OVERSEAS STUDIES</strong></td>
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<td>These courses are approved for the CSRE major and taught overseas at the cam-</td>
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<td>pus indicated. Students should discuss with their major advisers which courses</td>
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<td>would best meet individual needs. Descriptions are in the “Overseas Studies”</td>
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<td>section of this bulletin or at the Overseas Studies office, 126 Sweet Hall.</td>
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<td>108X.</td>
<td>Race and Ethnicity in Mexico</td>
<td>5</td>
<td>Win (Shadow)</td>
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</tbody>
</table>

**DRAMA**

Emeriti: (Professors) Wendell Cole, Martin Esslin, Helen W. Schrader, H. Donald Winbigler; (Associate Professor) Miriam B. Lidster; (Adjunct Professors) Evelyn M. Draper, Inga Weiss

Chair: Charles R. Lyons

Drama Division

Professors: Jean-Marie Apostolidès (French and Italian, Drama), Charles R. Lyons (Drama and Comparative Literature), Carl Weber

Associate Professors: William S. Eddelman, Harry J. Elam, Jr., Alice Rayner, Rush Rehm (Drama and Classics), Anña Deavere Smith (on leave 1997-98)

Professor (Teaching): Michael F. Ramsaur

Senior Lecturers: Patricia Ryan, Alexander Stewart, Connie Strayer

Lecturer: Amy Freed

Consulting Professors: Margaret Booker, Lee Breuer

Artist in Residence: Cherrie Moraga

Black Performing Arts Division

Director: Harry J. Elam, Jr.

Steering Committee: Ryan Bathé (student), Elena Becks (Committee on Black Performing Arts), Richard Benjamin (student), Earl Black
(African and Afro-American Studies), Sterling Brown (student), Sally Dickson (Multicultural Development), Kim Fowler (Committee on Black Performing Arts), Tina Gridiron (Black Community Service Center), Erica Harper (student), Sharon Holland (English), Jewel Hudson (ASSU Law Office), Fabienne McPhail (Black Community Service Center), Robert Moses (Committee on Black Performing Arts, Dance), Willee Tpliver (student), Seraphina Uludong (Committee on Black Performing Arts, student), Jacqueline Wigfall (student)

Dance Division
Coordinator: Susan Cashion
Senior Lecturers: Susan Cashion, Tony Kramer
Lecturers: Richard Powers, Janice Ross
Lecturers: Kristine Elliott, Diane Frank, Linda Hurkmans, Theresa Maldonado

Drama Division

The Department of Drama bases its undergraduate and graduate programs on the integration of theory and performance. The faculty commit themselves to the need for artists to be able to analyze their aesthetic work and for scholars to be able to understand specialization to prepare students for continued work at the graduate level, either in professional or conservatory programs that aim to educate artists for careers in the theater. As well, the Drama major offers a generalist theater education for those who wish to use the major as the core of a comprehensive liberal arts education. The Ph.D. program, which demands that its candidate work as both theorists and theater artists, offers its candidates a chance to develop their skills for further work in the professional and University theaters.

Undergraduate Programs
Bachelor of Arts

The requirements for the A.B. degree in Drama are planned to integrate the critical and historical study of drama with the study and experience of performance. The major provides aesthetic and critical opportunities for students to develop special aptitudes. For example, a student may elect an emphasis in acting, directing, design, or critical theory or may combine areas of emphasis. Examples of how students can structure course work to take advantage of such an emphasis are available from the major adviser. Students are encouraged to declare a major in their sophomore year.

The core program of Drama courses required of all majors is:
1. Performance/Literature: 161, 162, and 163
2. Stage Management Project: 134
3. A practical production class in technical theater or performance: one of 39A, 39B, 39C, or 29
4. Senior Project: every Drama major must complete an approved Senior Project in the area of their specialization: a minimum of 2 units in 200

Two years of a college-level foreign language are strongly recommended.

All majors, in addition to completing the core described above, would be required to complete one of the five specializations described in further detail below:

1. Acting:
   a) 120A, B (Fundamentals of Acting)
   b) The student must have completed at least 4 units of 29 and acted in at least two department productions.
   c) 125B (Actor and Director)
   d) 28 (Make-Up for the Stage)
   e) 47 (Period Movement and Dance)
   f) Three additional acting classes
   g) One course in dramatic literature
   h) Eight units of approved electives

2. Directing:
   a) 170 (Introduction to Directing), and 171 (Undergraduate Theater Workshop)
   b) 125B (Actor and Director)
   c) 166 (Performance, Space, and Technology)
   d) 159 (Shakespeare)
   e) 30 (Introduction to Theatrical Design)
   f) One course in acting
   g) One course in dramatic literature
   h) Eight units of approved electives

3. Playwriting/Dramaturgy:
   a) 177 (Playwriting)
   b) 170 (Introduction to Directing)
   c) 176 (Undergraduate Dramaturgy Project)
   d) 60 (Performance, Space, and Technology)
   e) 159 (Shakespeare)
   f) Two courses in acting
   g) One course in dramatic literature
   h) Eight units of approved electives

4. Design/Stagecraft:
   a) 30 (Introduction to Theatrical Design)
   b) 131 (Lighting Design)
   c) 132 (Costume Design)
   d) 133 (Stage Scenery Design)
   e) 39A, 39B, 39C (Performance: Crew)
   f) 166 (Performance, Space, Technology)
   g) Two courses in design
   h) Eight units of approved electives

5. Performance Theory and Cultural Studies:
   a) 164 (Search for the American Character)
   b) 156 (Contemporary Ethnic Drama)
   c) 159 (Shakespeare)
   d) 166 (Performance, Space, and Technology)
   e) Twenty units of course work in dramatic literature, criticism, theater history, history,
art history, and so on, to be determined in consultation with the undergraduate adviser.

SENIOR PROJECT

Work for this project normally begins in Spring Quarter of the junior year and is completed by the end of the senior year. The student must do a senior project in his or her area of specialization: Acting, Directing, Playwriting/Dramaturgy, Design/Stagecraft, Performance Theory and Cultural Studies. The project can be a creative or research project, or a combination of both. The student has the option of writing an essay associated with the project. Students receive credit for Senior Projects through Drama 200, Senior Project.

Students pursuing Senior Projects should consult with both the Department of Drama undergraduate adviser and a faculty adviser in the project's specialty area. These consultations should take place early in the junior year. Students must petition approval of Senior Projects through the Department of Drama undergraduate adviser. Projects are typically approved by the department faculty at the end of Spring Quarter of the junior year or the end of Autumn Quarter of the senior year.

The student proposal should include an outline of the courses the student has taken and grades received in the area requirements, and should describe the courses in which they plan to enroll as part of the project. It should describe in detail the purpose and methods involved in the project; a bibliography if appropriate; and a one-to-two page abstract of the associated essay if an essay is part of the project.

MINORS

For students wishing to minor in Drama, the following core requirements must be met:
1. The three-quarter sequence in Performance/Literature: 161, 162, 163.
3. A practical production class in technical theater or performance: 39A or 39B or 39C or 29.
4. Elective courses totaling a minimum of 15 units from the specified courses in any one of the five specializations listed above would constitute a minor concentration in: Acting, Directing, Playwriting/Dramaturgy, Design/Stagecraft or Performance Theory and Cultural Studies.

HONORS PROGRAMS

DRAMA

For a limited number of students, the department confers the degree of Bachelor of Arts with departmental honors in Drama. To be considered for departmental honors, students must meet the following requirements:
1. The student must have fulfilled the requirements for the Drama major.
2. The student must be a Drama major in good standing with a grade point average (GPA) of 'B+' including all the student's work in Drama.
3. The student must have completed prerequisites courses in the area of specialization with a GPA of 'A-' or better.
4. The student must have completed a Senior Project that the Department of Drama considers outstanding.
5. Honors are awarded on the basis of both the Senior Project and the student's entire work in the Department of Drama.

HUMANITIES

An honors program in Humanities is available for Drama majors who wish to supplement their major with related and carefully guided studies. See the "Humanities Special Programs" section of this bulletin for a description of the honors program. Students who enroll in it may offer Humanities 160 and two seminars from 190-198 in fulfillment of the departmental elective requirement.

GRADUATE PROGRAMS

DOCTOR OF PHILOSOPHY

All graduate study in the Department of Drama leads to the Ph.D. degree. Students in the graduate program are meant to integrate practical theater work with critical and historical study of dramatic literature and theory. All candidates are expected to function both as scholars and as artists. The curriculum offers practical concentration in directing. At the same time, each candidate studies theory, aesthetics, history, and literature to develop a thorough knowledge of the field of drama that leads to original and significant scholarly work. The typical course of study is outlined below under "Units and Course Requirements," but, in consultation with a faculty adviser, students may design a program that integrates practical and critical or theoretical aspects in a way suitable to his or her own background and submit that plan to the department's Graduate Studies Committee during the first year of study.

University regulations regarding this degree are discussed in the "Graduate Degrees" section of this bulletin. The following department requirements are in addition to the University's basic requirements for the doctorate.

UNITS AND COURSE REQUIREMENTS

1. A minimum of 72 units of graduate courses and seminars in support of the degree in addition to the doctoral dissertation.
2. The sequence in Dramatic Criticism and Critical Theory (300, 301).
3. A minimum of five additional graduate seminars in dramatic literature, theater history,
A directing, or aesthetic theory. One of them must be in theater history (360 or 361), one in directing, and one in dramatic literature in the Department of Drama.


LANGUAGE REQUIREMENT

The candidate must demonstrate reading knowledge of one foreign language in which there is a major body of dramatic literature. The language requirement may be fulfilled in any of the following ways:

1. Achievement of a sufficiently high score (70th percentile) on the foreign language examination prepared by the Educational Testing Service (ETS). Latin and Greek are not tested by ETS.
2. A reading examination given each quarter by the various language departments, except for Latin and Greek.
3. Passage with a GPA of 'B' or higher of a course in literature numbered 100 or higher in a foreign language department at Stanford.

The language requirement must be met before the student can be advanced to candidacy.

TEACHING REQUIREMENT

Five quarters of supervised teaching at half time are a required part of the Ph.D. program. The requirement is normally met by teaching three courses during the second year and two courses during the third year.

QUALIFYING EXAMINATIONS

Candidates must complete three qualifying examinations, one by the end of each of the first three years of study at Stanford. The first qualifying examination, to be taken in the Spring Quarter, consists of a four-hour written test. The second qualifying examination must be done as six tutorial essays in the following sequence: two essays written during each of the three quarters. Each sequence of six essays must be written under the supervision of at least two faculty members. The two essays must be submitted in draft by the end of the sixth week of the quarter, so that they may be revised by the final week of the quarter. After they are approved by the faculty adviser, the essays are read and evaluated by the Graduate Studies Committee. The final qualifying examination is in the form of an oral that approximates the format of the University Oral. Here, however, three faculty from the Department of Drama examine the candidate. This oral examination must be completed by the end of the seventh week of Spring Quarter. With their adviser, graduate students should work out a program of exam areas, drawing from the following periods:

Classical
Medieval and Renaissance
Neoclassical
Romantic and Early Realistic
Modern, 1870-1956
Contemporary, 1956 to the present

SATISFACTORY PROGRESS

Graduate students in Drama are expected to make consistent progress toward the completion of the Ph.D. degree. At the end of the first year, the departmental Graduate Studies Committee evaluates the work of each student in classes, seminars, qualifying examinations, and in performance work. Continuation in the program depends upon the recommendation of this faculty group. At the end of the second year, the committee reviews the student’s work in consideration of advancement to candidacy. At the end of the third year, students are expected to have developed a dissertation prospectus and completed the University Oral Examination.

APPLICATION FOR CANDIDACY

By the end of the second year of residence, the following requirements or appropriate equivalents must be completed:

1. Dramatic Criticism and Critical Theory sequence (300, 301) and four seminars (including one in Theater History, either 360 or 361)
2. The directing workshop series (370-374), including the successful production of two works in public performance
3. A foreign language
4. At least two qualifying examinations

Based on its evaluation of the student’s progress, the Graduate Studies Committee certifies the student’s qualifications for candidacy. Upon favorable action, the student files formal application for candidacy, as prescribed by the University, by the end of Summer Quarter of the second year.

UNIVERSITY ORAL EXAMINATION

The dissertation prospectus must be approved by the candidate’s adviser and by the departmental Graduate Studies Committee by the end of Spring Quarter of the third year. A University Oral examination is to be taken during the fourth year. The purpose of the University Oral is to demonstrate the candidate’s ability to conduct significant research in the general area of the dissertation.

DISSERTATION

Normally, the Ph.D. program is completed in four years. The first year should be devoted to full-time graduate study, the second and third years to graduate study and teaching, the fourth year to writing the dissertation. Following formal admission to candidacy, the dissertation must be completed and approved within five years from the quarter in which candidacy is granted. A candi-
date taking more than five years is required to reinstate candidacy by re-passing the written examinations on dramatic literature.

APPLICATION AND FELLOWSHIPS

Applicants for the Ph.D. program may write directly to the Department of Drama for information and to the Graduate Admissions Office (Old Union, Stanford, CA 94305-3005) for an application. In addition to the required statement of purpose, all applicants must submit a statement detailing their practical theater experience and a sample of their written critical work. An interview, while not required, is recommended. Interviews are best scheduled after January 10 and before February 7. Graduate students in the Department of Drama begin study in the Autumn Quarter of each academic year; there are no mid-year admissions. All graduate students must be degree candidates. All admissions materials must be submitted to the Department of Drama, Memorial Auditorium m144, Stanford, CA 94305-5010 by December 18, 1997.

The Department of Drama awards a number of fellowships to students in the Ph.D. program.

FOR MORE INFORMATION

Write to the Department of Drama, Memorial Auditorium, m144, Stanford, CA 94305-5010 or telephone (650) 723-2576. The FAX number is 723-0843. Email is et.jlf@forsythe.stanford.edu

JOINT Ph.D. IN DRAMA AND HUMANITIES

The Department of Drama participates in the Graduate Program in Humanities (GPH) leading to a joint Ph.D. degree in Drama and Humanities. For a description of that program, see the "Humanities Special Programs" section of this bulletin.

BLACK PERFORMING ARTS DIVISION

The Committee on Black Performing Arts (CBPA) is an interdisciplinary program supporting the presence of Black art forms at Stanford. Started as a student project in 1968, the committee became an official University program in 1972. In 1997, the CBPA joined the Department of Drama as a division.

The CBPA functions as: (1) a liaison with departments in hiring faculty and devising courses in Black performing arts; (2) a presenter of professional performances in dance, drama and music, symposia and film, framed by related academic study in drama, dance, history, sociology, anthropology and philosophy; (3) a producer of student productions; (4) as a resource for student organizations promoting artistic expression in the Black cultural tradition. Through the cooperation of departments, students are able to take relevant courses in dance, drama, music, and literature. While the offerings do not, at this time, constitute an academic minor, students are able to concentrate studies in Black performing arts as part of the A.B. major in Afro and African American Studies or Drama.

The CBPA publishes a journal, the Black Arts Quarterly (BAQ), three times a year. The BAQ is a forum for reflective explorations of Black performativity. It showcases original student work from campuses across the country and addresses the material impact of Black representation in the arts, in media, and popular culture.

The CBPA has developed a strong relationship with the city of East Palo Alto through holding artist residencies in the community and via "Dreams of a City: The East Palo Alto Project." The project incorporated commissioning plays, co-producing a video documentary and creating an archive about the community. The CBPA intends to continue its relationship with East Palo Alto in its future programming.

DANCE DIVISION

The Dance Division aims to develop a trained body, an aesthetic imagination, and an active engagement through the experience of movement. In this way, the program supplements the University's emphasis on stimulating the whole range of "intelligences" outside the strictly verbal, including the bodily kinesthetic, spatial, musical, and personal.

Since its inception in 1920, dance at Stanford University has positioned itself responsively to the needs of a changing university and society. By offering a range of studio and lecture courses aimed at enhancing understanding of dance as a way to create and communicate meaning, the program enables students to make connections between dance and other disciplines.

UNDERGRADUATE PROGRAMS

Students who wish to major in Drama with a specialization in Dance should see an undergraduate adviser in the Dance Division.

MINORS

For students wishing to minor in Dance, the following core requirements must be met and a program of study arranged in consultation with the minor adviser in Dance.

1. Three of the following four courses in Theory/Advanced Theory, for a total of 12 units: 160A, Dance History and Philosophy; 160B, Dance and Live Art in the 20th Century; 168, Dance and Culture in Latin America; 242, The Work of Art and the Creation of Mind.
2. 134, Stage Management Project: For a Dance Production.
3. A practical course in performance selected from among: 23, Public Performance; 27, Faculty Choreography; 105, Grupo Folklorico Los Decanos; and 106, Stanford Vintage Dance Ensemble.
4. 169, Methodologies for Creation, Staging, and Reconstruction
5. Elective courses totaling a minimum of 12 units from any studio dance classes. There must be a concentration of at least three classes chosen from a single dance form, with the other classes chosen from at least two other dance forms. A member of the dance faculty must confirm that the student has attained an appropriate level of proficiency in their areas of emphasis. The studio dance classes are as follows: 27, Dance for Musical Theater; and from the series in Modern Dance (40, 45, 140, 141, 165), Latin American Dance (42, 43, 75, 142), Jazz (44, 144, 145), Social Dance (46, 146, 147), and Ballet (48, 148, 149).

GRADUATE PROGRAMS
The A.M. degree in Education/Dance Specialization addresses fundamental issues of how to nurture effective educational leadership. One major emphasis of the program is to develop strategies for revitalizing and refocusing teaching skills in response to changing societal needs. Values and ethics in education are examined through course work that focuses on artistic considerations of human development, the patterning of dance education in a cross-cultural perspective, and teaching practices. To apply for admission to graduate study, successful completion of undergraduate courses in dance at Stanford, a bachelor's degree in dance from an accepted university or college, or proof of equivalent professional experience is required. For further information about the Dance Division of the Department of Drama, contact Janice Ross.

COURSES
(WIM) indicates that the course meets the Writing in the Major requirements.
(AU) indicates that the course is subject to the University Activity Unit limitations (8 units maximum).

DRAMA DIVISION
Registration for most drama classes takes place at the first class meeting; further registration information is printed in the Times Schedule each quarter. Some class sizes are limited and required advanced registration in the Department of Drama, room 144, Memorial Hall.

INTRODUCTORY
2. Introduction to Theater—Lecture introducing students to all aspects of the theater and specialties of the discipline that contribute to the final theatrical event.
   3 units (Ramsaur)
   alternate years, not given 1998-99
11N. Stanford Introductory Seminar: Shakespeare’s King Lear at the Beginning of the 17th Century and the End of the 20th—Preference to freshmen. The political and the related family issues of Shakespeare’s play remain vital and speak to our age as the play did to its original audience. GER:3a (DR:7)
   4 units, Aut (Lyons)
12N. Stanford Introductory Seminar: Antigone—From Ancient Democracy to Contemporary Dissent—Preference to freshmen. Sophocles’ tragedy as evidence of the tensions inherent in the democracy of ancient Athens, the myth as a paradigm for modern philosophical and ethical approaches to social change, and a look at modern dramatic versions (Brecht, Anouilh, Fugard, von Trotta) and essays (Hegel, Marx, Kierkegaard, Heidegger) that show how Antigone may be relevant to contemporary issues, (the status of women, the struggle to save the environment, and resistance to illegitimate political authority). GER:3a (DR:7)
   4 units, Aut (Rehm)
13N. Stanford Introductory Seminar: Technology and Popular Culture—Preference to freshmen. Fiction, film, and television all represent “technology,” which can be used either to construct utopian schemes (technology bringing a new world) or as the image of the feared product of our technological advances (the Frankenstein image). GER:3a (DR:7)
   4 units, Spr (Rayner)
14N. Stanford Introductory Seminar: Contemporary German Drama from Brecht to Heiner Mueller—Preference to freshmen. Traces the movement from the modernist playwright Bertolt Brecht and the Berliner Ensemble to the postmodern theater of Heiner Mueller. GER:3a (DR:7)
   4 units, Win (Weber)
15N. Stanford Introductory Seminar: Visual Aesthetics and the Theater—Preference to freshmen. Theatrical styles reflect the ways cultures see themselves and are linked with artistic and cultural developments in any historical period. A look at selected primary periods to analyze the various ways in which theatrical presentations grow out of common artistic visions. Dramatic texts, slides, and video. GER:3a (DR:7)
   4 units, Win (Eddelman)
20. Acting: An Introduction—Theater games and physical exercises in concentration, attention, playing an objective, voice, movement, stage terminology, characterization, performing a monologue, and
rehearsal techniques. Provides an experiential overview of actor training and prepares actors for advanced courses. Enrollment limited.

2 units, Aut, Win, Spr (Staff)

21A. Chicano Performance Workshop—Training in the particular genre of Chicano/Latino plays working toward public performance.

2 units, Aut (Martinez)

22. Scene Work—For actors who complete substantial scene work with graduate directors in the graduate workshop.

1-2 units, any quarter (Staff)

28. Make-up for the Stage—The basic techniques of make-up application for the artist and/or actor, which include aging, prosthetics, stylization, characterization, animals, and fantasy make-up.

2 units, Aut (Strayer)

29. Acting in Performance—Students cast in department productions receive credit for their participation as actors; 1-2 units for Graduate Directing Workshop projects and 1-3 units for major productions (units determined by instructor). May be repeated. Prerequisite: consent of instructor.

1-3 units, any quarter (Staff)

30. Introduction to Theatrical Design—Lecture/lab introducing basic skills of visual communication used in stage productions. Design and construction methods for stage scenery, costumes, and lighting.

5 units, Win (Eddelman, Stewart)

33. Drafting for the Theater—Lecture/lab introducing basic mechanical drawing techniques utilized by scenic and lighting designers. Basic pencil techniques through orthographic and isometric drawing, culminating with the technique of drop point perspective.

2 units (Stewart)

alternate years, given 1998-99

34. Stage Management Techniques—Survey lecture introducing the production process and the duties and responsibilities of a stage manager.

2 units, Aut, Win, Spr (Stewart)

37. Costume Construction—Lecture/lab introducing basic skills of constructing costumes for the stage.

2 units, Spr (Strayer)

39A,B,C. Theater Performance: Crew—Participation in the design and technical areas of department productions. Students commit to a specific show and receive credit for preparation and construction as a member of “running crew” in a specific area.

1-3 units, any quarter (Staff)

39A. Scenery and/or Property
39B. Lighting and/or Sound
39C. Costumes and/or Make-up

53. Greek Tragedy—(Enroll in Classics/Greek 12.)

3-5 units, Win (McCall)


4 units, Aut (Eddelman)

INTERMEDIATE

Primarily for the major but open to all undergraduates who have the necessary prerequisites.

101. Performance I: Essentials for the Actor/Dancer—Freshman preference in Autumn. Performance requires a special kind of concentration that is based on preparation, awareness, and attention. The fundamentals of performance shared by actors and dancers start with a primary focus on the physical body as an instrument. Techniques: warming up the body, voice, and mind; working with a partner; observing as a cornerstone of acting; playing an objective; adjusting to reality (i.e., developing a flexible body and mind).

3 units, Aut, Win (Ryan, Kramer)

103. Improvising—Improvisational theater techniques that teach spontaneity, cooperation, teambuilding, and rapid problem solving. Emphasizes common sense, attention to reality, and helping your partner, based on TheatreSports™ by Keith Johnstone. Required readings, written papers, and attendance at performances of improvisational theater. Enrollment limited.

3 units, Aut, Spr (Ryan)

113. Group Communication—Focuses on interpersonal processes of communication as they relate to intergroup experience.

4 units, Win, Spr (Schrader)

120A,B. Acting: The Fundamentals—For students who intend to begin serious actor training. First quarter emphasizes understanding and utilization of the basic vocabulary of objective and action. Theater games and improvisation develop the actor’s ability to act with focus, intention, and energy. Introduction to the basics of characterization and transformation. Second quarter: the actor’s spontaneity and imagination are used to reveal the life of a play in working with dramatic texts. Approaches to the actor’s craft ranging from character biography to moment-to-moment truthful playing. Exercises from Strasberg, Meisner, Chaiken, Linklater, and others. Scene and monologue work are drawn from primarily naturalistic plays. Outside rehearsal time required. Must be taken in sequence.

120A. 3 units, Aut, Win (Freed)
120B. Prerequisite: 120A or consent of instructor.  
3 units, Win, Spr (Freed)

121F. Acting: Imagination and Technique—Designed to expand the actor’s range and ability to play in a variety of theatrical styles and idioms. Utilizes a wide variety of rehearsal techniques to deepen the actor’s preparation process including the role of Stanislavski-based techniques when dealing with non-naturalistic theatrical texts. Exercises expand vocal and physical range in scene work from Shakespeare, Chekhov, absurdist, and non-naturalistic plays.  
4 units, Aut (Freed)

121M. Playing the Monologue—Techniques for preparing audition pieces and performing extended monologues.  
3 units, Spr (Ryan)

121P. Acting: Period and Style—Designed to provide the actor with an approach to Classical, Expressionistic, and historically unfamiliar texts. Acting skills beyond the “Method” emphasize work on voice, language, and movement. Material from Classical texts that have a strong formal “style” as well as plays that have special demands based on theatrical time-period or genre. Scenes and monologues from Shakespeare, the Restoration, Molière, Feydeau, Chekhov, and Shaw  
4 units, Spr (Freed)

125B. Acting Techniques: The Actor and Director—Approaches to the actor/director relationship.  
3 units, Win (Breuer)

131. Lighting Design—Lecture/lab dealing with all of the practical and aesthetic aspects of lighting: electricity, light sources, color instrumentation, control, drafting, plotting, and the aesthetic principles of lighting design, interpretation, and concept. Prerequisite: 30 or consent of instructor.  
3 units, Spr (Ramsaur)

132. Costume Design—Visual analysis of historical styles of costume design interpreted for the modern theater and developed by the student in various presentational media. Prerequisite: 30 or consent of instructor.  
3 units, Win (Strayer)

133. Stage Scenery Design—Creations of increasing complexity involving text analysis, historical and artistic style, visual research, spatial organization, drafting, sketching, model building, and director-designer collaboration. Prerequisite: 30, or consent of instructor.  
3 units, Aut (Staff)

134. Stage Management Project—For students stage managing a Department of Drama production.  
1-5 units, any quarter (Stewart)

135. Project in Theatrical Production—Assistant directing; stage, costume, lighting, and sound design; technical production, stage managing, or other work in connection with Department of Drama productions. Prerequisite: consent of instructor.  
1-5 units, any quarter (Staff)

155. Black Drama—The dramaturgy, i.e., thematic issues, styles, and aesthetics of black playwrights in the U.S., the Caribbean, and Africa.  
4 units (Elam) alternate years, given 1998-99

156. Contemporary Ethnic Drama—Contemporary plays by playwrights of color (Asian-American, African-American, Latino-American) are analyzed to identify the diversity of cultural experience in the American theater.  
4 units (Elam) alternate years, given 1998-99

156H. Plays of Lillian Hellman—Overview of the plays of Lillian Hellman, arguably the most important American woman playwright of the mid-20th century.  
4 units, Spr (Booker)

159B,C,F. Shakespeare—(Enroll in English 173B.C.F.)  
159B. 5 units, Win (Rebholz)  
159C. 5 units, Spr (Parker)  
159F. 5 units, Aut (Summit)

4 units, Spr (Rehm)

162. Performance and the Actor—How an actor’s performance serves as a sign for class, race, and gender in various historical moments. Uses theories of acting (Diderot, Brecht, Artaud, Meyerhold, Stanislavski), play texts, and contemporary performances to examine the cultural mapping of the body on stage. Emphasis is on works that present culturally significant images of women. Readings from plays by Benmussa, Brecht, Shakespeare, Kleist, Hansberry, Genet, Fornes, Strindberg, Chekhov, Churchill, Kushner, Wertenbaker. GER:3a (DR:7) (WIM)  
4 units, Win (Rayner)

163. Performance and America—Key dramas by women, men, Asian-Americans, Latino-Americans, and African-Americans are examined to the role of dramatic performance within contemporary American society as an affective and effective arena for inducing social change. GER:3a,4b (DR:3 or 7) (WIM)  
4 units, Aut (Elam)

164. A Search for the American Character—The American character through an interview process of
individuals of varying social, ethnic, racial, and gender backgrounds. Final project is a performance piece or an essay.

5 units (Smith) alternate years, given 1998-99

166. Performance, Space, and Technology—Five major periods in theater history (Classical, Elizabethan, 17th-18th century, modern, and contemporary) are analyzed through dramatic texts, slides, and videos to discover the ways in which performing styles, spatial evolutions, and technological advances express the cultural and social changes that are embedded in the theatrical event.

4 units, Aut (Eddelman)

170. Introduction to Directing—Prerequisite: consent of instructor.

4 units, Aut (Booker)

171. Undergraduate Theater Workshop—Undergraduate directors present one-act plays in workshop performances. Credit available for actors as well as directors. Prerequisite: consent of instructor or 170.

1-4 units, Win (Booker, Ramsaur)

176. Undergraduate Dramaturgy Project—Serve as a dramaturg on any department production. Research on the production’s text source, the writing of program notes, the compilation and editing of the playbill, and possible adapting/editing of the performance text or translating text from a foreign language.

2 units, any quarter (Staff)

177. Playwriting—Opportunity to develop new material for the stage or complete a one-act play. Prerequisite: consent of instructor.

5 units, Win (Moraga)

178. Intensive Playwriting—Opportunity to develop new material for the stage or complete a play-in-progress. Focus is on the most essential elements of playwriting with an emphasis on the process of revision, culminating in public readings of highlights of plays-in-progress. Prerequisite: prior experience in playwriting preferred; consent of instructor.

5 units (Moraga) alternate years, given 1998-99

179. Fiction Writing and Reading—(Enroll in Spanish and Portuguese 282.)

4-5 units, Aut (Moraga)

180Q. Stanford Introductory Seminar: Noam Chomsky: The Drama of Resistance—Preference to sophomores. Focuses on the ideas and work of Noam Chomsky, who challenged the reigning political and economics paradigms governing the U.S. the last 30 years. Chomsky’s model for linguistics, Chomsky’s work in the U.S., S.E. Asia, the Middle East, Central America, E. Timor, the media, “terrorism,” ideology and culture, student/popular movements, and the role of resistance.

3 units, Win (Rehm)

181Q. Stanford Introductory Seminar: Concepts of Modernity—Art, Theater, Politics, and Culture—Preference to sophomores. The idea of modernity as it is expressed in Moscow, Paris, and Berlin between the wars comes under attack by the reactionary forces of Communism, Fascism, and Nazism. Slides and film selections.

3 units, Spr (Eddelman, Weber)

182Q. Stanford Introductory Seminar: Improvisation—The Jazz of Theater—Preference to sophomores. The new paradigm of improvisation as a “method” and as a developing art form. Readings on the theory of improvisation compared and reinforced by attendance at performances of improvised theater in the Bay Area. Prerequisite: consent of instructor.

3 units, Spr (Ryan)

190. Special Research—Individual project on the work of a playwright, period, or genre. Prerequisite: consent of instructor.

1-5 units, any quarter (Staff)

191. Independent Research—Individual supervision of off-campus internship. Prerequisite: consent of instructor.

1-18 units, any quarter (Staff)

ADVANCED COURSES

Courses numbered 200 through 299 are designed for advanced undergraduates and graduates.

200. Senior Project—See “Undergraduate Programs” for description.

2-9 units, any quarter (Staff)

203. Advanced Improvisation—By audition only. Become members of the Stanford Improvisers (SIMPS) group. Prerequisite: 103.

3 units, Win (Ryan)

213. Stanford Improv Ensemble—By audition only. For members of the improvisation troupe only. Special project work. Prerequisite: 103. (AU)

1-2 units, Aut, Spr (Ryan)

220A,B,C. The Actor’s Studio—Aimed at the serious student of acting committed to the discipline of the craft and willing to meet the challenges of performance from the perspective of the literate actor. Advanced work in voice, movement, text, acting styles, verse, and language, with guest teachers. Taken in sequence; all three quarters required. Prerequisites: audition, consent of instructor.

alternate years, given 1998-99

231. Advanced Lighting Design—Individually structured class in lighting mechanics and design resolved through experimentation, discussions, and written reports. Prerequisite: 131 or consent of instructor.

1-5 units, any quarter (Staff)
232. Advanced Costume Design—Individually structured tutorial for costume designers. Prerequisite: 132 or consent of instructor.
1-5 units, any quarter (Staff)

233. Advanced Scenery Design—Fast-paced, individually structured workshop. Prerequisite: 133 or consent of instructor.
1-5 units, any quarter (Staff)

235. Project in Theatrical Production—See 135.
1-5 units, any quarter (Staff)

242. The Work of Art and the Creation of Mind—(Enroll in Education 200X.)
3 units, Win (Eisner, Hannah, Rehm, Ross, Sano)

4 units, Spr (Rehm)

262. Performance and the Actor—See 162.
4 units, Win (Rayner)

263. Performance and America—See 163.
4 units, Aut (Elam)

266. Performance, Space, and Technology—See 166.
4 units, Aut (Eddelman)

277. Playwriting—See 177.
5 units, Win (Moraga)

279. Fiction Writing and Reading—(Enroll in Spanish and Portuguese 282.)
4-5 units, Aut (Moraga)

290. Special Research—Individual project on the work of a playwright, period, or genre.
1-5 units, any quarter (Staff)

GRADUATE

For graduates; open to advanced undergraduates with consent of instructor.

3-5 units, Aut (Eddelman)

301. From Theory to Criticism—Seminar addresses the relationship between aesthetic theory and practical criticism by examining selected works of recent scholarship in 5th-century Athenian tragedy, Shakespeare, and Beckett that display the relative impact of poststructuralism, cultural materialism, postmodernist theory, feminism(s), or psychoanalytic aesthetic theory.
3-5 units, Win (Lyons)

302. Practical Criticism—Workshop on the practical side of the profession: preparing a dissertation prospectus, writing research grant proposals, and revising and placing journal articles.
3 units, any quarter (Lyons)

311. Seminar: Classical Drama—(Enroll in Humanities 311.)
3-5 units, Aut (Nightingale)

355R. Seminar: Radical Latina Scholarship—Examination of Latin American theorists, including Boal, Buenaventura, and Freire, and feminist and queer theory in application to Chicanas writing for theater today.
3-5 units, Spr (Moraga)

355W. Seminar: August Wilson—Overview of the plays of August Wilson, the most influential African American playwright of the 20th century, and one of the most important American playwrights writing today.
3-5 units, Win (Elam)

358B. Seminar: Bertolt Brecht—One of the most important and influential European playwrights and directors of the 20th century.
3-5 units, Win (Weber)

360. Seminar: Topics in Theater History—Classical Greece to the Beginning of the 19th Century—The stylistic evolution of theaters and staging from the classical period to the early development of Romanticism. Emphasis is on the ways theaters and staging reflect their own cultural and spatial environments.
3-5 units (Eddelman)
alternate years, given 1998-99

370-374. Graduate Directing Workshop—The core curriculum for graduate students in directing. Prerequisite: consent of instructor.

370. Concepts of Directing—The basic directorial definitions of time, space, movement, and the performer/spectator relationship. Experimentation with texts chosen from literary and other sources, including works from the realistic tradition in drama, using a multi-form performance space.
5 units, Aut (Weber)

371. Design for Directors—Introduction to the concepts of stage, costume, and light design. Creative procedures, e.g., designing groundplans and elevations, building a model, sketching and swatching of costumes, and practical work in the lighting-lab.
3 units, Win (Eddelman, Ramsaur)

5 units, Spr (Rehm)
373. Directing the Actor—Approaches to the actor/director relationship. The application of recent theories of language acquisition and use to acting problems. The development of exercises and rehearsal strategies that relate speech in the theater to contemporary notions of language use.

3 units, Win (Breuer)

374. Graduate Directors' Performance Project—Production of a full-length play selected in consultation with faculty. Project is designed by graduate students, sometimes in collaboration with undergraduate design students, under the supervision of design faculty. Four to five weeks rehearsal. Public performance.

3-5 units, any quarter (Ramsaur, Rehm)

375. Seminar: Directing and Dramaturgy—Discussion/application of dramaturgy, directorial methods, and visual concepts in plays from the Elizabethan tradition to postmodernist texts. Work on the text is tested in the staging of scenes.

3-5 units, Aut (Weber)

376. Graduate Directors' Dramaturgy Project—Serve as a dramaturg on any department production. Work includes research on the production's text source, the writing of program notes, and the compilation and editing of the play bill. Possible adapting/editing of the performance text, and translating text from a foreign language.

2 units, any quarter (Staff)

377. Graduate Directors' Staged Reading Project—Presentation of a new or newly adapted work for the stage, in a mode employed in the professional theater for the development of new plays. Two to four rehearsals. Public performance.

2 units, any quarter (Staff)

390. Tutorial

1-9 units, any quarter (Staff)

399. Dissertation Research

1-9 units, any quarter (Staff)

BLACK PERFORMING ARTS DIVISION

Students are advised to consult the Time Schedule each quarter to note changes. See Drama and the Dance Division for additional course listings and descriptions.

AFRICAN AND AFRO-AMERICAN STUDIES

105. Introduction to African and Afro-American Studies

5 units (Staff)

DANCE DIVISION

Registration for most dance classes takes place at the first class meeting; further registration information is printed in the Times Schedule each quarter. Some class sizes are limited and require advanced registration in the Dance office in Roble Gym.

Series classes (I, II, III) should be taken in order or with consent of instructor. Selected dance courses may fulfill the General Education Requirements—see the Appendix.

INTRODUCTORY

Open to all students. No previous dance experience needed.

40. Modern Dance I—Technical and creative principles of modern dance designed to develop the body as an articulate instrument.

1 unit, Aut, Win, Spr (Cashion)

42. Dances of Latin America—Selected dances of Latin America, specifically Argentina, Brazil, Chile, Cuba, Mexico, Peru, and Puerto Rico. (AU)

1 unit, Aut (Cashion)

43. Afro-Brazilian and Afro-Peruvian Dance—Brazilian dance forms of the Northeast: Samba, Maracatu, Maculele, Bloco Afro, and Peruvian dance of the coastal region: Festejo and Zamacueca.

1 unit, Aut (Cashion)

44. Jazz Dance I—Introduction to basic techniques with emphasis on current jazz style. Historical jazz steps are studied to enhance an understanding of contemporary jazz forms.

1 unit, Aut, Win, Spr (Kramer)

45. Improvisation plus Contact—Development of improvisation skills as a creative performance practice and as a basis for choreography; techniques of contact improvisation.

1 unit, Aut, Win, Spr (Kramer)

46. Social Dances of North America I—Introduction to partner dances found in American popular culture: blues, fox trot, swing, tango, two-step, waltz. Fee. (AU)

1 unit, Aut, Win, Spr (Powers)

47. Period Movement and Dance—Surveys movement and historic dance from the past five centuries, including the general deportment, body language, and demeanor distinctive to each era. Historic dances traditionally included in dramatic repertoire are the galliard, pavan, branle, minuet, waltz, polka, polonaise, ragtime one-step, tango, and Charleston.

1 unit, Spr (Powers)

48. Ballet I—Emphasis is on the fundamentals of classical technique: alignment, basic barre exercises, and movement sequences in the center and across the floor. (AU)

1 unit, Aut, Win (Powers)

47. Period Movement and Dance—Surveys movement and historic dance from the past five centuries, including the general deportment, body language, and demeanor distinctive to each era. Historic dances traditionally included in dramatic repertoire are the galliard, pavan, branle, minuet, waltz, polka, polonaise, ragtime one-step, tango, and Charleston.

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1 unit, Spr (Powers)

48. Ballet I—Emphasis is on the fundamentals of classical technique: alignment, basic barre exercises, and movement sequences in the center and across the floor. (AU)

1 unit, Aut, Win (Powers)

47. Period Movement and Dance—Surveys movement and historic dance from the past five centuries, including the general deportment, body language, and demeanor distinctive to each era. Historic dances traditionally included in dramatic repertoire are the galliard, pavan, branle, minuet, waltz, polka, polonaise, ragtime one-step, tango, and Charleston.

1 unit, Spr (Powers)

48. Ballet I—Emphasis is on the fundamentals of classical technique: alignment, basic barre exercises, and movement sequences in the center and across the floor. (AU)

1 unit, Aut, Win (Powers)
DRAMA 425

Folklorico, popular/social, and religious. Taught for technical and cultural understanding.

2 units, Win (Cashion)

76. Dance for Musical Theater—Dance performance skills and choreography appropriate for musical theater.

2 units, Win (Cashion)

INTERMEDIATE

Open to all undergraduates who have previous dance experience.

140. Modern Dance II—Intermediate technique. Introduction of improvisation and composition in directed studies.

1 unit, Aut, Win, Spr (Kramer)


2 units, Win (Moses)

144. Jazz Dance II—Intermediate level emphasizing alignment, control, rhythmic coordination, and the learning of movement combinations.

1 unit, Aut, Spr (Moses)

146. Social Dances of North America II—Accelerated survey of partner dances found in American popular culture: fox trot, quick step, swing, tango, waltz. Prerequisite: some dance experience.

1 unit, Aut, Win (Powers)

147. Living Traditions of Swing—In-depth instruction in many forms of swing dancing from the early Lindy of the 1920s to 6- and 8-count Lindy shag, street swing, and hustle. A foundation of partnering and improvisation is supplemented with advanced variations.

1 unit, Spr (Powers)

148. Ballet II—Intermediate level. Continuation of 48, repeating the fundamentals with increased complexity and introducing additional movement vocabulary.

1 unit, Aut, Spr (Staff)

165. Dance Heritage: History and Styles—Workshop/seminar on the origins of movement forms that have influenced Western contemporary dance, e.g., Duncan, Graham, Horton, Limón, Aliley, Cunningham. Specific approaches and techniques utilize cross-cultural and historical perspectives; studio work is amplified by lectures, films, and readings.

2 units, Win (Ross, Staff)

ADVANCED

Open to all undergraduates who have previous dance experience.

141. Modern Dance III—Intermediate/advanced technique. Study of complex movement combina-

tions, concentrating on the demands of performance.

1 unit, Aut, Spr (Frank)

145. Jazz Dance III—Advanced level of technical proficiency. Focuses on advancing performance skills of projection and movement quality. Prerequisite: consent of instructor.

1 unit, Aut, Win, Spr (Moses)

149. Ballet III—Advanced level of classical ballet training.

1 unit, Win, Spr (Elliott)

PERFORMANCE

23. Public Performance—For students participating in movement oriented performance. (AU)

1 unit, Aut, Win, Spr (Kramer)

27. Faculty Choreography—Rehearsal and performance of faculty choreography. Selection by audition.

1 unit, Aut, Win, Spr (Staff)

100. Performance Workshop—Explores and develops composition and performance skills. Required for participation in certain faculty and/or student-directed productions.

1 unit, Win, Spr (Kramer, Frank)

105. Grupo Folklorico Los Decanos—Dance material of Latin America (e.g., Folk, Carnival) arranged for performance. A variety of performing experiences off and on the Stanford campus.

1 unit, Aut, Win, Spr (Cashion)


1 unit, Aut, Win, Spr (Powers)


1 unit, Aut, Win, Spr (Elliott)

THEORY

Classroom or classroom/studio combination courses on topics in Dance and Performance.

160A. Dance History and Philosophy—Historical lecture/survey of Western theatre dance, examining changing notions of gender construction and the body in dance over the last 400 years. Ballet and modern dance are looked at in the context of social and political events and artistic developments and ideologies. GER:4c (DR:†)

3-4 units, Win (Ross)

160B. Dance and Live Art in the 20th Century—Critical history and analysis of the development of live art in postmodern dance and performance art of the 20th century. Topics: the body as an art medium,
performance art, experimental dance, and redefinitions of gender in live art. GER:4c (DR:f)
3-4 units, Spr (Ross)

168. Dance and Culture in Latin America—
(Same as Anthropology 109.) Selected dance forms of Latin America are viewed as aspects of human behavior. Emphasis is on cultural influences (European, African, and indigenous) which have shaped the ritual and social dance forms of Argentina, Brazil, Chile, Cuba, Mexico, and Puerto Rico.
3-4 units, Spr (Cashion)

169. Methodologies for Creation, Staging, and Reconstruction—Develops skills and criteria for the choreographic process in dance. The work of invention, staging, and reconstruction in dance. Students are led through the creative process and practical considerations in the making of a dance work.
3 units, Aut (Moses, Powers) alternate years, not given 1998-99

183Q. Stanford Introductory Seminar: Writing Dance Criticism—Preference to sophomores. The historical and practical issues in writing dance and performance criticism. Emphasis is on developing skills of critical viewing and descriptive, evaluative, and interpretative writing of dance performances.
2 units, Aut (Ross)

190. Special Research—In-depth study of topics related to the discipline of dance.
1-5 units, any quarter (Staff)

191. Independent Research—Individual supervision of off-campus internship. Prerequisite: consent of instructor.
1-18 units, any quarter (Staff)

ADVANCED THEORY

Courses numbered 200 through 299 are designed for advanced undergraduates and graduates in the A.M. program.

240. Society, Education, and Dance—The role of dance as a transmitter of cultural perspectives. Cross-cultural analysis tracing the roots of dance from ritual to higher education and incorporating 20th-century philosophers’ perspectives on the social functions of dance.
4-5 units, Aut (Cashion, Ross)

1 unit, Aut (Ross)

242. The Work of Art and the Creation of Mind—
(Enroll in Education 200X.)
3 units, Win (Eisner, Hannah, Rehm, Ross, Sano)

246. Dance Teaching Internship—Methodologies of teaching dance and using music resources within a variety of classroom situations. Instruction and guided practice in the preparation of lesson plans, developing sequence and progression in a class setting, and using accompaniment.
1-3 units, Win (Frank)

248. Graduate Design Project—Three part, individually designed creative project required for completion of the master’s degree.
5 units (Ross)

290. Special Research—Individual project on the work of any choreographer, period, genre, or dance-related topic.
1-5 units, any quarter (Staff)

EAST ASIAN STUDIES

Director: Arthur Wolf

Affiliated Faculty:

Anthropology: Amy Borovoy, Harumi Befu (emeritus), Hill Gates, Miyako Inoue, G. William Skinner (emeritus), Arthur P. Wolf

Art: Britta Erickson, John D. La Plante (emeritus), Michael Sullivan (emeritus), Melinda Takeuchi, Richard Vinograd


Comparative Literature: David Palumbo-Liu

Economics: Masahiko Aoki, John J. Gurley (emeritus), Lawrence Lau, Scott Rozelle, Yingyi Qian

Education: Thomas Rohlen

History: Gordon Chang, Peter Duus, Roger Hart, Harold L. Kahn, Jeffrey P. Mass, Ellen Neskar, Lyman P. Van Slyke (emeritus)

Law: Victor Hao Li

Linguistics: Peter Sells

Philosophy: Philip J. Ivanhoe, David S. Nivison (emeritus)

Political Science: John W. Lewis, Daniel Okimoto, Michel Oksenberg, Jean Oi, Kurt Steiner (emeritus), Robert E. Ward (emeritus)
Religious Studies: Carl Bielefeldt, Bernard Faure (on leave 1997-98), Philip J. Ivanhoe, David S. Nivison (emeritus), Lee H. Yearley
Sociology: Andrew Walder

In addition, a number of other Stanford faculty have some teaching or research interests related to East Asia: Takeshi Amemiya (Economics), Barton Bernstein (History), Henri-Claude de Bettignies (Business), Walter P. Falcon (Institute for International Studies), William B. Gould (Law), Tetsuya Kataoka (Hoover Institution), Thomas Metzger (Hoover Institution), David Montgomery (Business), Ramon Myers (Hoover Institution), Mark Peattie (Hoover Institution) Sylvia Yanagisako (Anthropology), Pan A. Yotopoulos (Food Research)

The Center for East Asian Studies (CEAS) coordinates all University instructional, research, and special activities related to China, Japan, and Korea. Faculty and students who share a common interest in the study of East Asia are brought together by the center from a broad range of academic concerns covering nearly every discipline and historical period. In addition to supporting a wide variety of academic and extra-curricular activities on the Stanford campus, the center is also involved in programs that link the University's resources on East Asia with civic groups, secondary schools, and local colleges in the San Francisco Bay Area. As a National Resource Center designated by the Department of Education, Title VI, CEAS sponsors programs that provide opportunities for East Asian Studies faculty and students to meet and work with one another.

Further information may be obtained from the Center for East Asian Studies, Building 50, Stanford University, Stanford, California 94305-2034; telephone (650) 723-3362, 723-3363.

UNDERGRADUATE PROGRAMS
BACHELOR OF ARTS

The undergraduate major in East Asian Studies enables students committed to the study of China and/or Japan to design a major curriculum that combines language training and interdisciplinary course work. The structure of the major is intended to provide broad exposure to China or Japan (or East Asia as a whole) through a combination of courses in several departments. The student should integrate his or her studies around a thematic or disciplinary focus. The hallmarks of the East Asian Studies major are concentration on a single area of the non-Western world, interdisciplinary breadth, and flexibility of focus.

Potential majors must submit a "Student Proposal for a Major in East Asian Studies" not later than the end of the first quarter of the junior year for approval by the East Asian Studies Subcommittee on the Bachelor of Arts program.

Majors must complete at least 75 units of course work on China, Japan, and/or Korea. Courses to be credited toward major requirements must be completed with a grade point average (GPA) of 'C' or better. These units are to be distributed as follows:

1. Language: completion of 30 units of course work in Chinese, Japanese, or Korean language for letter grades. Students are encouraged to undertake further language training, but only 30 units of language course work count toward the requirements for the major.
2. History: completion of at least 15 units from one of the following course sequences:
   - History 192A, 192B, 192C (Chinese History)
   - History 194A, 194B, 194C, 194D (Japanese History)
3. Substantive Concentration: 30 units—completion of appropriate course work focused on a disciplinary or topical theme that may also specify either China or Japan and a particular historical era. The concentration may not include language courses. The concentration normally includes course work in at least two departments. Examples of substantive concentrations include:
   - Traditional Japanese civilization
   - Social transformation of modern China
   - Economic development in East Asia
   - Political economy of postwar Japan
   - Fine arts and literature in late imperial China
   - Culture and society of modern Japan
4. Senior Essay: completion of a paper of approximately 7,500 words to be submitted as a senior essay in East Asian Studies. Insofar as possible, the essay should integrate the substantive concentration. It may be written for one of the courses offered as part of that concentration or in connection with directed individual study, which may be credited toward the substantive concentration. An East Asian Studies course that satisfies the university Writing in the Major requirement should be completed before beginning the senior essay. This year Asian Languages 133 and 138 and Art 2 satisfy the WIM requirement.

MINORS

The goal of the minor in East Asian Studies is to provide the student with a broad background in East Asian culture as a whole while allowing the student to focus on a geographical or temporal aspect of East Asia. The minor may be designed from the following set of courses, for a total of six courses.

Three courses are to be chosen among the following offerings:
Asian Languages 91, Traditional East Asian Civilization: China
Asian Languages 92, Traditional East Asian Civilization: Japan
Political Science 125, The Rise of Industrial Asia
A course in the History sequences 192 (China) or 194 (Japan)

One undergraduate seminar and two other courses from among courses listed each quarter as courses approved for East Asian Studies majors, including literature courses but excluding language courses. Applications for the minor are due no later than second quarter of the junior year.

HONORS PROGRAM

 Majors with a GPA of 3.25 or better in all courses related to East Asia may apply for the honors program no later than the final quarter of the junior year. Application entails submitting an honors prospectus to the student's adviser for approval. Admission is granted by the subcommittee on the A.B. program, acting on the adviser's recommendation.

Honors requirements are satisfactory completion of (1) an honors thesis of high quality of approximately 10,000 words to be submitted in lieu of the senior essay otherwise required for the major, (2) 5 to 10 units of directed individual study in connection with the thesis project, and (3) one advanced level colloquium or seminar treating China, Japan, or both.

COTERMINAL DEGREE

The center admits a limited number of Stanford undergraduates to work for a coterminal A.M. degree in East Asian Studies. While the coterminal degree plan permits admission to a graduate program as early as the eighth quarter and no later than the end of the eleventh quarter of undergraduate study at Stanford, the center accepts A.M. applications only once a year. Therefore, applications must be submitted by January 1. Applicants are expected to meet the same general standards as those seeking admission to the A.M. program: they must submit a written statement of purpose; a Stanford transcript; three letters of recommendation, at least two of which should be from members of the department of concentration; and scores from the General Test of the Graduate Record Exam. In addition, applicants must provide a list of courses they intend to take to fulfill degree requirements. The decision on admission rests with the A.M. Admissions Committee of the Center for East Asian Studies. Students must meet all requirements for both A.B. and A.M. degrees. They must complete a total of 15 full-time quarters (or the equivalent), or three full quarters after completing 180 units for a total of 217 units.

EAST ASIAN STUDIES
THME HOUSE (EAST)

EAST (Payson J. Treat) House, on campus at Governor's Corner, is an undergraduate residence that houses 60 students and offers them a wide variety of opportunities to expand their knowledge, understanding, and appreciation of Asia. A member of the East Asian faculty serves as resident fellow of EAST House. Assignment is made through the regular undergraduate housing draw.

KYOTO CENTER
FOR JAPANESE STUDIES

Students interested in the study of Japanese language, history, culture, and social organization can apply to the Kyoto Center for Japanese Studies, a September-to-April program managed by Stanford that includes students from eight other American universities. Every Spring Quarter, the Stanford Center in Technology and Innovation, also at the Kyoto Center, offers an academic quarter focused on Japanese organizations and the political economy of research, development, and production of high technology and advanced industries. An internship in a Japanese firm, laboratory, or agency follows the training program. For information about Kyoto, contact the Overseas Studies office at Sweet Hall, telephone (650) 723-3558.

GRADUATE PROGRAMS
MASTER OF ARTS

The A.M. program in East Asian Studies is designed both for students who plan to complete a Ph.D., but who have not yet decided on the particular discipline in which they prefer to work, and for students who wish to gain a strong background in East Asian Studies in connection with a career in nonacademic fields such as business, law, education, journalism, or government service. However, career-oriented students should realize that a master's degree in East Asian Studies alone may often provide insufficient preparation for work in many professions, and they are advised to plan for additional professional training.

The master's degree program allows a great deal of flexibility in combining language training, interdisciplinary area studies, and a disciplinary concentration. The director of the center assigns faculty advisers to all students. Members of the staff and faculty are available for academic and career planning. The A.M. program is normally completed in two academic years, but students can shorten this time by receiving credit for prior language work or by attending summer sessions. Students are urged to complete the degree requirements in less than two years if their background makes it possible.
Applicants must submit scores for the General Test of the Graduate Record Examination. Foreign applicants are also required to take the Test of English as a Foreign Language. Applications for admission and financial aid may be obtained by writing to Graduate Admissions, Old Union, Stanford University, Stanford, California 94305-3005. The deadline for completed applications for admission and financial aid is January 1.

The basic requirements for the A.M. degree in East Asian Studies are as follows:

**Language Requirement**—Students must complete the equivalent of Stanford’s first three years of language training in either Chinese, Japanese, or Korean. Students entering the program without any language preparation should complete first- and second-year Chinese, Japanese, or Korean within the first year of residence at Stanford. This will necessitate completing a summer language program. Language courses taken at Stanford must be for letter grades.

The language requirement may be satisfied in part or in full by placing into an appropriate Stanford language class through the language proficiency exam given by the Department of Asian Languages. Students who fulfill this minimum three-year language requirement before completing other requirements are encouraged to continue language study, or take courses in which Chinese or Japanese are used, for as long as they are in the program. Language courses beyond the third-year level may be applied to the Area Studies requirement discussed below.

Students in the A.M. program are eligible to apply for the Inter-University Language programs in Taipei, Beijing, and Yokohama. For further information, see the “Institute for International Studies” section of this bulletin. Work completed in one of these programs may be counted toward the A.M. degree’s language requirement. Students may petition to have advanced work counted for a maximum of three out of the nine area studies courses required for the degree.

**Area Studies Requirement**—Students must complete the 1-unit core course, East Asian Studies 330, and an additional nine courses numbered 100 or above related to East Asia. A total of 37 units beyond the courses used to fulfill the third-year level language requirement is required for the degree. (Chinese and Japanese language courses numbered 100-199 are considered to be at the third-year level and do not count toward the courses required for the degree.) The nine courses must be 3 or more units and be taken for a letter grade. At least 18 units must be designated primarily for graduate students (typically at the 200 level).

An integral part of the program is training in research and a demonstration of research ability in a discipline. Three courses, one of which must be a seminar, colloquium, or advanced course in which a research paper on China or Japan is written, must be within a single department. A master’s paper, representing a substantial piece of research, should be filed with the center’s program office as part of the graduation requirements. With the adviser’s approval, the master’s paper requirement may be satisfied by using a research paper written for an advanced course. The six additional area courses may be taken in departments of the student’s choosing. Some theory-oriented or methodological courses may be used to meet part of these requirements provided they are demonstrably useful for understanding East Asian problems. Except in unusual circumstances, credit toward the Area Studies requirement is not given for courses taken before entering the A.M. program. Students in this program may, however, take courses for exchange credit at the University of California, Berkeley with the approval of their adviser and the Office of the Registrar. In any case, Stanford University requires the payment of three full quarters of tuition for a University degree to be granted.

**JOINT DEGREE PROGRAMS EAST ASIAN STUDIES AND LAW**

This joint program grants an A.M. degree in East Asian Studies and a Doctor of Jurisprudence (J.D.) degree. It is designed to train students interested in a career in teaching, research, or the practice of law related to East Asian legal affairs. Students must apply separately to the East Asian Studies A.M. program and to the Stanford School of Law and be accepted by both. Completing this combined course of study requires approximately four academic years, depending on the student’s background and level of training in Chinese or Japanese.

**EAST ASIAN STUDIES AND EDUCATION**

This joint program grants an A.M. degree in East Asian Studies and a secondary school teaching credential in social studies. To be eligible for this program, students should apply to the A.M. program in East Asian Studies and then apply to the Stanford Teacher Education Program during the first year at Stanford. Completing the joint program requires at least two years, including one summer session when beginning the education component of the program.

**EAST ASIAN STUDIES AND BUSINESS**

This joint program grants an A.M. degree in East Asian Studies and a Master of Business Administration. Students must apply separately to the East Asian Studies A.M. program and the Graduate School of Business and be accepted by both. Completing this combined course of study requires approximately three academic years (perhaps including summer sessions), depending
on the student’s background and level of training in Chinese or Japanese language.

**EAST ASIAN STUDIES AND HEALTH SERVICES RESEARCH**

The M.S. degree in Health Services Research (HSR) is an interdisciplinary program training students in research and analytic skills for careers in the growing health industry as innovative health planners, system analysts, and policy-makers. Students concluding the first year of graduate study at Stanford are eligible to apply for the degree, which is granted by the Department of Health Research and Policy in the School of Medicine. The degree may be pursued concurrently with the second and subsequent years of graduate study and is awarded on completion of 45 units of course work. This work is to be split approximately equally between research workshops and formal courses relevant to the health sector. Each student’s program is planned to meet individual interests in health services in addition to fulfilling HSR core requirements. For more information, apply to the Program Administrator, Division of Health Services Research, Health Research and Policy Building, Stanford, CA 94305.

**DOCTORAL PROGRAMS**

Stanford does not offer a Ph.D. in East Asian Studies. However, there are more than 100 doctoral students with a specialization on China or Japan within various departments and schools of the University. The departments that offer an East Asian concentration are: Anthropology, Art, Asian Languages, Comparative Literature, Economics, History, Linguistics, Philosophy, Political Science, and Religious Studies. It is also possible to specialize in East Asia within some of the doctoral programs of the professional schools of Business, Education, and Law. Inquiries should be directed to the individual department or school concerned.

**FINANCIAL AID**

Students in A.M. or Ph.D. programs who plan to do work in Chinese or Japanese language, or language-related area courses, may be eligible for Foreign Language and Area Studies (FLAS) fellowships and are encouraged to apply for them at the time of application to Stanford. Recipients of FLAS fellowships must be American citizens or permanent residents. For further information, contact FLAS Grant Administrator Building 50, Stanford, California 94305-2034.

**COURSES**

The courses listed below deal primarily with China, Japan, and/or Korea. Many other theoretical and methodological courses within the various departments at Stanford are taught by faculty who are East Asian specialists; these courses often have a substantial East Asian component and may be found under the department listings in this bulletin.

330. Core Seminar: Issues and Approaches in East Asian Studies
1 unit, Aut (Staff)

**AFFILIATED DEPARTMENT OFFERINGS**

**ANTHROPOLOGY**

4. Language and Culture
4-5 units, Aut (Inoue)

115. East Asian Miracle: Anthropological and Economic Perspective
5 units, Spr (Borovoy)

118A. 20th-Century Chinese Societies
5 units, Win (Gates)

121. Japanese Society and Culture
5 units, Spr (Inoue)

161. Human Ecology: Oceanic and East Asia
5 units, Aut (Gates)

223. Seminar on Japanese Anthropology
5 units, Aut (Inoue)

**ART**

2. Ideas and Forms in Asian Art——(WIM)
5 units, Win (Vinograd)

12. Theme and Style in Japanese Art
4 units, Spr (Takeuchi)

126A/226A. Introduction to the Study of Chinese Painting
4 units (Vinograd) not given 1997-98

126B/226B. Early Chinese Pictorial Art
4 units (Vinograd) not given 1997-98

126C/226C. Artists and Systems in Later Chinese Painting
4 units (Vinograd) not given 1997-98

126E/226E. Across Cultures: Encounters of Eastern and Western Art
4 units (Vinograd) not given 1997-98

129/229. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868
4 units (Takeuchi) not given 1997-98

129A/229A. Painting in Late Medieval and Early Modern Japan, 1500-1868
4 units, Win (Takeuchi)

228A. Seminar: Pictorial Art and Cultural Spaces in Late Ming China
4 units, Aut (Vinograd)

229D. Graduate Seminar: Problematizing the Japanese Landscape of Travel
4 units, Aut (Moerman, Takeuchi)
229E. Colloquium: "Pictures of the Floating World"—Images from Japanese Popular Culture
4 units, Win (Takeuchi)

229G. Colloquium: Women and Gender in Japanese Art
4 units (Takeuchi) not given 1997-98

262. Undergraduate Seminar: China Avant Garde—The Phoenix Arising
4 units (Erickson)

ASIAN LANGUAGES

51/151. Japanese Business Culture
3 units, Win (Dasher)

55/155. Screening Modern China: Chinese Film and Culture
4 units, Spr (Chow)

71N. Stanford Introductory Seminar: Language and Gender in Japan—Myths and Reality
3 units, Win (Matsumoto)

75Q. Stanford Introductory Seminar: The Chinese Cultural Revolution and its Aftermath
1 unit, Win (Y. Wang)

91. Traditional East Asian Civilization: China
5 units, Aut (Rudolph)

92. Traditional East Asian Civilization: Japan
5 units, Win (Matisoff)

114. Haiku
3 units (Ueda) not given 1997-98

120. The Budoir and the Frontier
4 units, Win (Egan)

131. Chinese Poetry in Translation
4 units, Aut (Staff)

132. Chinese Fiction and Drama in Translation
4 units, Win (Wang)

133. Modern and Contemporary Chinese Literature in Translation—(WIM)
4 units, Spr (Lyell)

135. Japanese Drama in Translation
4 units (Matisoff) not given 1997-98

137. Japanese Fiction in Translation
4 units, Aut (Bolton)

138. Modern Japanese Literature in Translation—(WIM)
4 units, Spr (Reichert)

141. Chinese Mythology and Lyrical Imagination
4 units (Liu) not given 1997-98

181. Japanese Women Writers
4 units (Matisoff) not given 1997-98

187/287. Romance, Desire, and Sexuality in Modern Japanese Literature
4 units, Spr (Reichert)

CHINESE

Students registering for the first time in a first- or second-year course must take a placement test if they have had any training in Chinese before entering Stanford. Sign up for a section in the department office before the quarter begins.

1,2,3. First-Year Modern Chinese
5 units, Aut, Win, Spr (Chuang, Shou, Zeng)

1B,2B,3B. First-Year Modern Chinese for Bilingual Students
3 units, Aut, Win, Spr (Rozelle, Staff)

5. Intensive First-Year Modern Chinese
8 units, Sum (Staff)

6,7,8. Beginning Conversational Chinese
2 units, Aut, Win, Spr (Staff)

10,11,12. Beginning Southern Min (Taiwanese) Conversation
2 units, Aut, Win, Spr (Staff)

15,16,17. Beginning Cantonese Conversation
2 units, Aut, Win, Spr (Leung)

21,22,23. Second-Year Modern Chinese
5 units, Aut, Win, Spr (Y. Wang, Staff)

21B,22B,23B. Second-Year Modern Chinese for Bilingual Students
3 units, Aut, Win, Spr (Y. Wang)

25. Intensive Modern Chinese
8 units, Sum (Staff)

27,28,29. Intermediate Chinese Conversation
2 units, Aut, Win, Spr (Shou)

51. Chinese Calligraphy
1-2 units, Win, Spr (Chuang)

CHINESE/ADVANCED

101,102,103. Third-Year Modern Chinese
5 units, Aut, Win, Spr (Yu)

101,102B,103B. Third-Year Modern Chinese for Bilingual Students
3 units, Aut, Win, Spr (Yu)

105. Intensive Modern Chinese
8 units, Sum (Staff)

121,122,123. Advanced Chinese Conversation
2 units, Aut, Win, Spr (Chuang)

3-4 units, Aut, Win, Spr (Yu)

CHINESE/GRADUATE

200. Directed Reading in Chinese
units by arrangement, Aut, Win, Spr (Staff)

201. Proseminar
5 units, Win (J. Wang)

125/205, 126/206, 127/207. Beginning Classical Chinese
5 units, Aut, Win, Spr (Sun, Sahleen)
208. Teaching Asian Languages  
2 units, Win (Sun)

211,212,213. Advanced Modern Chinese  
5 units, Aut, Win, Spr (Chuang)

214. Introduction to Modern Chinese Literature  
5 units, Aut (Lyell)

215. Yueh-fu Poetry  
4 units, Spr (Egan)

221,222,223. Advanced Classical Chinese  
221. Philosophical Texts  
5 units, Aut (Sahleen)  
222. Historical Narration  
5 units, Spr (Wang)  
223. Literary Essays  
5 units (Staff) not given 1997-98

241,242,243. Modern Chinese Literature  
241. The Short Story  
5 units (Lyell) not given 1997-98

242. Essay  
5 units, Aut (Chuang)

243. The Novel  
5 units, Win (Lyell)

261. Sources of Chinese Poetry  
4 units, Spr (Saussy)

263. Lyric (shih) I  
4 units (Saussy) not given 1997-98

264. Lyric (shih) II  
4 units (Liu) not given 1997-98

266. Chinese Tzu'u Poetry (Song Lyrics)  
4 units, Win (Staff)

271,272. Traditional Chinese Fiction  
4 units (Wang) not given 1997-98

273. Chinese Drama  
4 units, Spr (J. Wang)

334. Seminar in Modern Chinese Literature  
5 units, Spr (Lyell)

361. Seminar on Tzu'u Poetry of the Tang and Song  
5 units, not given 1997-98

371. Seminar in Chinese Literary Criticism  
5 units (Saussy) not given 1997-98

400. Advanced Language Training  
1-15 units per quarter (Staff)

JAPANESE

Students registering for the first time in a first- or second-year course must take a placement test if they have had any training in Japanese before entering Stanford. Sign up for section in instructor’s office before quarter begins.

1, 2, 3. First-Year Modern Japanese  
5 units, Aut, Win, Spr (Busbin, Staff)

5. Intensive First-Year Modern Japanese  
12 units, Sum (Staff)

3 units, Aut, Win, Spr (Staff)

17/117, 18/118, 19/119. Second-Year Japanese for Professionals  
3 units, Aut, Win, Spr (Kubo)

21, 22, 23. Second-Year Modern Japanese  
5 units, Aut, Win, Spr (Nebrig, Staff)

25. Intensive Second-Year Modern Japanese  
12 units, Sum (Staff)

27, 28, 29. Intermediate Japanese Conversation  
2 units, Aut, Win, Spr (Kubo, Staff)

30/130. Reading Technical Japanese  
1-3 units, Sum (Dasher)

JAPANESE/ADVANCED

101, 102, 103. Third-Year Modern Japanese  
5 units, Aut, Win, Spr (Arao)

104. Japanese for Chinese Specialists  
3-5 units, Spr (Staff)

105. Intensive Third-Year Modern Japanese  
12 units, Sum (Staff)

3 units, Aut, Win, Spr (Staff)

114. Japanese for Business  
3 units, Sum (Staff)

121, 122, 123. Advanced Japanese Conversation  
2 units, Aut, Win, Spr (Kubo, Staff)

177/277. The Structure of Japanese  
4 units, Spr (Matsumoto)

JAPANESE/GRADUATE

200. Directed Reading in Japanese  
units by arrangement, Aut, Win, Spr (Staff)

201. Proseminar  
5 units, Aut (Matisoff)

208. Teaching Asian Languages  
2 units, Win (Matsumoto)

211, 212, 213. Advanced Modern Japanese  
5 units, Aut, Win, Spr (Matsumoto, Staff)

246. Introduction to Classical Japanese  
5 units, Aut (Oyler)

247, 248. Readings in Classical Japanese  
247. 5 units, Spr (Matisoff)

248. 5 units (Hare) not given 1997-98

250. Intensive Reading in Modern Japanese  
4 units, Win (Matsumoto)

260. Japanese Poetry and Poetics  
4 units (Hare) not given 1997-98

280. Medieval Japanese Narrative  
4 units (Staff) not given 1997-98
281. Japanese Pragmatics
4 units (Matsumoto) not given 1997-98

296. Readings in Modern Japanese Literature
4 units, Win (Reichert)

298. Translation Workshop
4 units (Ueda) not given 1997-98

330. Seminar in Heian Fiction
5 units (Hare) not given 1997-98

333. Seminar in Japanese Classical Drama
5 units (Matisoff) not given 1997-98

396. Seminar in Modern Japanese Literature
5 units, Aut (Reichert)

400. Advanced Language Training
1-15 units per quarter (Staff)

KOREAN
1,2,3. First-Year Modern Korean
5 units, Aut, Win, Spr (Cho)

21,22,23. Second-Year Modern Korean
5 units, Aut, Win, Spr (Cho)

101,102,103. Third-Year Modern Korean
3 units, Aut, Win, Spr (Cho, Staff)

200. Directed Reading in Korean
units by arrangement, Aut, Win, Spr (Cho)

208. Teaching Asian Languages
2 units, Win (Staff)

271. The Structure of Korean
4 units (Cho) not given 1997-98

ECONOMICS

121. The Economies of Greater China and the World
5 units, Win (Rozelle)

124. The Japanese Economy
5 units, Spr (Aoki)

126. Comparative Economic Institutions: The Economics of Transition
5 units, Spr (Qian)

131. The Development of the Korean Economy
5 units, not given 1997-98

134. Development of the Newly Industrialized Economies
5 units, not given 1997-98

220. Marxist Economic Theory
5 units, not given 1997-98

292. Comparative Analysis of Organizations and Institutions
5 units, Spr (Aoki)

293. Reform and Transition in Socialist Economies
5 units, Spr (Qian)

EDUCATION

274. Learning, Teaching, and Schooling in Japanese Society
3-4 units (Rohlen) not given 1997-98

306C. Cultural Approaches to Technological Innovation and Learning
5 units, Spr (Mancall)

321A,B. Ethnographic Methods of Educational Research: Concepts, Data Collection, and Analysis
321A. 4-5 units (Rohlen) not given 1997-98
321B. 4-5 units, Aut (Lindee, McDermott)

HISTORY

5A. EAST House Seminar: Conflict and Crisis in Asia
1 unit, Aut (Neskar)

5B,C. EAST House Seminar: Topics TBA
1 unit, Win, Spr (Neskar)

75. The United States and East Asia
5 units, Aut (Chang, Duus)

90Q. Stanford Introductory Seminar: Buddhist Political and Social Theory
5 units, Spr (Mancall)

96S. Sources and Methods Seminar: Searching for Self—Biographies and Autobiographies in China
5 units, Aut (Neskar)

192A. Chinese History to the 13th Century
5 units, Aut (Neskar)

192B. Chinese History from the Mongols to Early Modern Times
5 units, Win (Kahn)

192C. Modern and Contemporary Chinese History
5 units, Spr (Van Slyke)

194A. Early and Medieval Japan to 1500
5 units, Aut (Mass)

194B. Late Medieval and Early Modern Japan
5 units (Staff) not given 1997-98

194C. 19th-Century Japan
5 units (Staff) not given 1997-98

194D. The Rise of Modern Japan
5 units, Spr (Duus)

291. Undergraduate Colloquium: Women in Japanese History
5 units, Aut (Totman)

292A. Undergraduate Colloquium: Japanese Lives—Autobiography and History
5 units (Duus) not given 1997-98

295A. Undergraduate Colloquium: The Korean War—Watershed in Asia
5 units, Win (Van Slyke)
296. Undergraduate Colloquium: Ordinary Lives—The Social History of Early Modern China
5 units, Spr (Kahn)

5 units, Win (Hart)

298/398. Imperialism, Colonialism, and National Identity in Modern Japan
5 units, Win (Duus)

299/399. Colloquium: Japan in the Age of Courtiers and Warriors, 1180-1333
5 units, Aut (Mass)

306B. Design and Methodology for International Field Research
1 unit, Win (Duus, Kollman, R. Roberts)

390A. Graduate Colloquium: Topics in Middle-Period Chinese History
4-5 units, Win (Neskar)

390B. Graduate Colloquium: Topics in Late Traditional Chinese History
4-5 units, Aut (Kahn)

392. Graduate Colloquium: Postwar Japan
4-5 units (Duus) not given 1997-98

395A. Graduate Colloquium: Early and Medieval Japan
4-5 units, Win (Mass)

395B. Graduate Colloquium: Late Medieval and Early Modern Japan, 1560-1800
4-5 units, Aut (Totman)

395C. Graduate Colloquium: Modern Japan
4-5 units, Spr (Duus)

493A,B. Graduate Seminar: Late Traditional Chinese History
8-10 units, Win, Spr (Brook)

498/498A. Graduate Seminar: Japanese Historical Texts
8-10 units, Win, Spr (Mass)

PHILOSOPHY

46. Introduction to Chinese Thought—(Same as Religious Studies 55.)
4 units (Ivanhoe) not given 1997-98

114/214. Neo-Confucianism
4 units, Win (Ivanhoe)

212. Interpreting Confucian Texts
5 units, Aut (Ivanhoe)

332. Essays and Letters of Zhuang Xuechang
3 units, Win (Ivanhoe)

POLITICAL SCIENCE

115. Chinese Politics
5 units, Win (Oi)

115J. Political Economy of Reform in China
5 units (Oi) given 1998-99

125. The Rise of Industrial Asia
5 units, Aut (Oi, Oksenberg, Raphael, Rohlen)

139. Japanese Foreign Policy
5 units, Aut (Okimoto)

215. Graduate Seminar: Environmental Politics in the Asia/Pacific Region
5 units, Win (Oksenberg)

215A. Graduate Seminar: Approaches to Chinese Politics
5 units, Spr (Oi)

215B. Graduate Seminar: Political Economy of Reform in China
5 units, Win (Oi)

223. Seminar: Japanese Politics
5 units, Win (Okimoto)

RELIGIOUS STUDIES

1. Introduction to Religion
4 units, Aut (Eisen, Hess)

6N. Stanford Introductory Seminar: Readings in Asian Religions
3 units, Win (Bielefeldt)

9N. Stanford Introductory Seminar: Ethical Status of Non-Human Animals
3 units, Spr (Ivanhoe)

11. Religious Classics of Asia
4 units, Win (Hess)

14. Introduction to Buddhism
4 units (Faure) not given 1997-98

18. Zen Buddhism
4 units, Spr (Bielefeldt)

20. Chinese Religious Thought and Practice
4 units (Faure) not given 1997-98

44Q. Stanford Introductory Seminar: Philosophical Views of Nature
3 units, Spr (Ivanhoe)
55. Introduction to Chinese Thought—(Same as philosophy 46.)
4 units (Ivanhoe) not given 1997-98

113. Zhuang Zi—(Same as Philosophy 113/213.)
5 units (Ivanhoe) not given 1997-98

116. Japanese Buddhism
5 units (Bielefeldt) not given 1997-98

117. Syncretism and Sectarianism in Chinese Buddhism
3 units (Faure) not given 1997-98

118. Ritual in East Asian Buddhism
4 units (Faure) not given 1997-98

119. Neo-Confucianism—(Same as Philosophy 114.)
4 units, Win (Ivanhoe)

124. Religion in Japan
5 units, Spr (Moerman)

136. Buddhist Yoga
4 units (Bielefeldt) not given 1997-98

150. Mahayana Buddhism
5 units (Bielefeldt) not given 1997-98

204. Graduate Seminar: Problematizing the Japanese Landscape of Travel
4 units, Aut (Moerman, Takeuchi)

210. Speech and Writing in the Buddhist Traditions
4 units (Faure) not given 1997-98

212. Interpreting Confucian Texts—(Same as Philosophy 212.)
5 units, Aut (Ivanhoe)

221. Ch’an/Zen and Local Religion
5 units (Faure) not given 1997-98

230A. Zen Buddhism Seminar
5 units (Bielefeldt) not given 1997-98

256. Japanese Buddhism Seminar
4 units (Bielefeldt) not given 1997-98

258. Japanese Buddhist Texts
5 units, Spr (Bielefeldt)

310. Buddhist Studies Proseminar
5 units, Win (Bielefeldt)

311. Buddhist Studies Seminar
5 units (Faure) not given 1997-98

319. East Asian Religions
(Bielefeldt, Faure, Ivanhoe, Yearley)

332. Essays and Letters of Zhuang Xuechang
4 units, Win (Ivanhoe)

SOCIIOLOGY

217. China’s Social Transformation
5 units, Win (Walder)
ety, to familiarize them with techniques for the analysis of contemporary economic problems, and to develop in them an ability to exercise judgment in evaluating public policy. There is training for the general student as well as for those who plan careers as economists in civil service, private enterprise, teaching, or research.

The undergraduate program provides an excellent background for those going on to graduate work in the professional schools (for example, business and law) and may also be structured to prepare students for a Ph.D. program in economics. The department's curriculum is an integral part of Stanford's programs in International Relations, Public Policy, and Urban Studies.

The primary objective of the graduate program is to educate students as research economists. In the process, students also acquire the background and skills necessary for careers as university teachers and as practitioners of economics. The curriculum includes a comprehensive treatment of modern theory and empirical techniques. Currently, 20 to 25 students are admitted each year.

The faculty represent a wide spectrum of interests and conduct research on a broad range of topics. Most fields of economics are covered, including alternative economic systems, comparative institutional analysis, econometrics, economic development, economic history, industrial organization, international trade, labor, macro- and microeconomic theory, mathematical economics, and public finance.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

Note—The department established a new curriculum for the undergraduate program, beginning Autumn Quarter 1992-93, consisting of a single unified track. Its purpose is to teach students to think and write clearly about economic problems and policy issues, using a mathematical orientation where appropriate and applying the basic tools of economic analysis. Major requirements are listed below.

REQUIREMENTS FOR THE MAJOR
(60 units)

1. Economics 1 (5 units)
2. Economics 180 (5 units). Students may substitute Math. 43, Math. 51, or an equivalent calculus course for this requirement. Some background in matrix theory is recommended.
3. Economics 80 (5 units). It is recommended that students satisfy this requirement before proceeding with the rest of the program.
4. Economics 51 and 52 (10 units). Requirement 2 must be completed before taking 51.
5. Two courses must be chosen from among Economics 111, 118, 140, 141, 145, 149, 150, 155, 156, 157, 160, and 165, and they must be taken at Stanford in California (10 units).
6. Economics 101 is required and must be taken at Stanford in California (5 units). This course may be taken only after completing requirement 5.
7. Twenty additional units, from economics courses numbered between 100 and 198 (excluding 190, and 191), must be taken. At least 10 units must be chosen from courses with a prerequisite of 51, 52, or both, and taught at Stanford in California.

OTHER REQUIREMENTS

No courses receiving Department of Economics credit under the preceding requirements may be taken CR/NC.

A grade point average (GPA) of 'C' or better must be received for all units applied toward the preceding requirements.

To use transfer credit in partial satisfaction of the requirements, the student must obtain written consent from the department's Associate Director of Undergraduate Study, who will establish the amount of credit to be granted toward the department requirements (see the Information Book for Economic Majors).

The time limit for satisfactory completion of a course is one year from the date an "incomplete" is given. Students are responsible for seeing that all grades of incomplete are cleared within the time limit.

SAMPLE PROGRAMS

Sample listings of upper-division economics electives may be examined in the department's Information Book for Economics Majors, available in Economics, room 136. Sample programs are provided for the following areas of emphasis: (1) liberal arts, (2) pre-business, (3) quantitative, (4) international, (5) political economy and regulation, and (6) preparation for graduate school in economics.

MINORS

The minor in Economics has two main goals. The first is to acquaint students with the rudiments of micro- and macroeconomic theory that are required of all majors. The second is to allow students to build basic competence in the application of this theory to two fields of economics of their choosing and the opportunity to specialize further in any one of these fields by taking one additional advanced course in the Department of Economics.

COURSE WORK

1. Economics 1 (5 units)
2. Economics 51 and 52 (10 units)
3. Two field courses chosen from among Economics 111, 118, 140, 141, 145, 149, 150, 155, 156, 157, 160, 165 (10 units)
4. One elective from economics courses between 100 and 198 (excluding 180, 190, and 191) (5 units)

OTHER REQUIREMENTS
All courses taken for the minor must be taken at Stanford in California.
No courses receiving Department of Economics credit under the preceding requirements may be taken CR/NC. A GPA of 'C' or better must be received for all units applied toward the minor. If any courses required for the minor are also required by a student’s major department (that is, Economics 1, 51, 52), an equivalent number of courses between 100 and 190 (excluding 180, 190, and 191) must be substituted for a minor in Economics. Students must complete their declaration of the minor no later than the last day of the quarter two quarters before degree conferral.

HONORS PROGRAM
The honors program offers an outstanding opportunity for independent research, creativity, and achievement. It is designed to encourage a more intensive study of economics than is required for the normal major, with course and research work of exceptional distinction. Honors students participate in an Honors Research Symposium during Spring Quarter, with some presenting their work on posters and others making oral presentations. The honors program requires:
1. Completing all requirements for the major, including Economics 102 and either 103 or 104 as electives under requirement 7 above. Another upper-division elective may be substituted for 101 (requirement 6) if desired.
2. Achieving a GPA in economics courses of at least 3.5. See details in the Information Book for Economics Majors.
3. Submitting an honors thesis of very high quality. The thesis is written under the direction of a member of the department or its affiliated faculty. Honors students may take up to 10 units of Honors Directed Reading (199D) for the purpose of completing the thesis. Units of 199D do not count toward the course work requirements for the basic economics major, or in the computation of the GPA requirement for honors.

Juniors interested in the honors program are urged to attend an informational meeting scheduled by the department’s Director of the Honors Program each Winter Quarter. Prospective candidates for the honors program must submit an application to the director no later than the end of the second full week of the third quarter before graduation (typically Autumn Quarter of the senior year). Also required, later in the same quarter, is a three-page thesis prospectus that must be approved by the thesis adviser.

GRADUATE PROGRAMS
Graduate programs in economics are designed to ensure that students receive a thorough grounding in the methodology of theoretical and empirical economics, while at the same time providing specialized training in a wide variety of subfields and a broad understanding of associated institutional structures. Toward these ends, the program is arranged so that the student has little choice in the curriculum at the outset but considerable latitude later on.

Students admitted to graduate standing in the department are expected to have a strong background in college-level economics, mathematics, and statistics. Preparation ordinarily consists of a college major in economics, a year-long calculus sequence that includes multivariate analysis, a course in linear algebra, and a rigorous course in probability and statistics.

MASTER OF ARTS
The department does not admit students who plan to terminate their graduate study with the A.M. degree. Students may (but need not) elect this degree in preparation for the Ph.D. degree. A master’s option is also available to Ph.D. candidates from other departments.

Admission—Prospective students must have completed the Stanford requirements for an A.B. in Economics or approximately equivalent training. Since students are required to take some of the same courses as Ph.D. candidates, similar preparation in mathematics and statistics generally is expected. Prospective applicants should submit their credentials together with a plan of study to the Director of Graduate Study for approval.

Requirements—A master’s program must satisfy the following criteria:
1. Completing, at Stanford, at least 45 units of credit beyond those required for the bachelor's degree, of which at least 40 units must be in the Department of Economics. Economics courses must include 202, 210, and at least two other 200-level courses. Undergraduate courses must be numbered 105 or higher. No seminar courses numbered 300 or above can be counted.
2. Demonstrating competence in empirical methodology at the level of Economics 270. Normally, this is done by including that course in the program of study.
3. Submitting two term papers (or a thesis of sufficient quality). At least one of these papers must be deemed to represent graduate-level work. Normally, this means that it is written in connection with a 200-level course. A maximum of 10 units of credit can be earned for a thesis toward the 45-unit degree requirement.
4. A GPA of 'B' must be maintained for all master's level work. In addition, a grade of 'B-' or
better must be earned in each of the two graduate theory courses. All courses must be taken for a letter grade.

**DOCTOR OF PHILOSOPHY**

Admitted students must be adequately prepared in calculus, linear algebra, and statistics (see above). When deemed appropriate, a student may be required to complete the necessary background preparation at Stanford. All students take a common core curriculum at the outset and later branch out into the desired fields of specialization. Well-prepared students should anticipate spending, with some overlap, approximately two years in course work and another two years in seminars, independent study, and dissertation research. The goal is to complete the program in four years, although some types of research programs may require at least five years to complete. The department has a strong commitment to guiding students through the program expeditiously.

Questions and petitions concerning the program and the admissions process should be addressed to the Director of Graduate Study, who has responsibility for administering the graduate program.

Specific requirements are best discussed in two stages, the first consisting of requirements for admission to candidacy and the second involving further requirements for earning the degree.

**Admission to Candidacy for Ph.D.**—A student may apply for admission to candidacy when the following minimal requirements are met:

1. Successful results on comprehensive examinations in “Price and Allocation Theory” (the examination based on material from Economics 202, 203, 204), “Theory of Income and Economic Fluctuations” (the examination based on material from Economics 210, 211, 212), and “Econometrics,” (the examination based on material from Economics 270, 271, 272).

2. Completing the requirements in two additional fields from the list below or one such field together with a substantial amount of work toward a minor in a related department approved by the Director of Graduate Study. Advanced fields include alternative approaches to economic analysis, comparative institutional analysis, econometrics, economic development, economic history, industrial organization, international economics, labor economics, mathematical economics, monetary theory and advanced macroeconomics, and public finance.

Each field listed above can be satisfied by completing two courses, although students in some fields may be advised to add a third course, which can then be counted toward the distribution requirement discussed later. All courses (or comprehensive exams, when offered) must be passed with a grade ‘B’ or better.

3. Completing a “candidacy paper,” normally written in conjunction with one of the special fields selected above.

It is expected that the student will meet, and indeed exceed, the above standard by the beginning of the third year of residency. When this is not possible for any reason, the Director of Graduate Study should be consulted as early as possible during the second year. Once it is deemed that the above standards have been met, the student should complete the Application for Candidacy for Degree of Doctor of Philosophy. After approval, candidacy remains valid for five years (although it can be terminated earlier by the department if progress is deficient); it can be renewed or extended beyond this period only under unusual circumstances.

**Further Requirements for the Ph. D. Degree—**

1. Additional Course Work: four other graduate-level courses must be completed. One of these must be from the area of economic history unless that field has already been selected above and, in any event, courses must be “distributed” in such a way that at least two fields not selected above are represented. In addition, if the special fields consist of econometrics together with mathematical economics, the distribution courses must include at least two from outside these areas. With the approval of the Director of Graduate Study, some of the distribution courses may be drawn from a minor subject, for those choosing that option.

2. Teaching Experience: each student must serve as a teaching assistant for at least one quarter. It is strongly recommended that this requirement be satisfied before the final year of residence.

3. Seminar Participation: each student is expected to participate in at least two all-year research seminars by the end of the fourth year of residence. Normally, participation in a seminar requires one or more oral presentations and the submission of a research paper (which, however, need not be completely separate from dissertation research).

4. Ph.D. Dissertation: the process involves selecting a topic, choosing an appropriate adviser, submitting a prospectus (signed by the adviser) outlining proposed research, selecting a three-member reading committee (usually all from the Department of Economics, although exceptions can be made under certain circumstances), passing the University oral examination at which these three faculty (and two other members of the Academic Council) ask questions about the completed research, and submitting a final draft of the work signed by all members of the reading committee. The student is advised to initiate this process as early as possible.
Ph.D. MINOR

To be recommended for the Ph.D. degree with Economics as a minor subject, a student must qualify in three fields of economics, one of which must be either "Price and Allocation Theory" or "Theory of Income and Economic Fluctuations." Qualification in these fields is tested in the department's comprehensive written examinations given annually. The standard of achievement in these examinations is the same for minor as for major candidates.

JOINT DEGREE PROGRAMS

The Department of Economics and the School of Law offer a joint program leading to the Ph.D. in Economics and the J.D. degree in Law. See the Stanford University bulletin Law School for descriptions of its participation in the joint program.

To qualify, the student's program objectives must clearly justify such a joint program. Decisions are made by the Director of Graduate Study. A student's program in economics must satisfy the same standards as a Ph.D. degree in Economics taken with a minor in Law. It is expected that dissertation research will cross department lines and that members of the dissertation committee will be drawn from both faculties.

Students normally spend the first year full time either in economics or in law and the second year full time in the other department. After the second year, courses in economics and law may be pursued simultaneously.

Other joint programs may be arranged; for example, the Ph.D. in Economics combined with one or two years of study in the School of Law, leading either to the nonprofessional Master of Legal Studies (M.L.S.) degree or the nonprofessional Master of Jurisprudence (J.M.). See the bulletin Law School for the requirements. Conversely, a student taking the J.D. in the School of Law may apply for an A.M. in Economics.

FELLOWSHIPS AND ASSISTANTSHIPS

The department awards a number of fellowships for graduate study. Some first-year students are awarded full fellowships, including a stipend and tuition. All students whose record justifies continuation in the program may be assured support for the second through fourth years in the form of employment as a teaching assistant or research assistant. These half-time appointments provide a stipend and tuition allowance. Entering students are not normally eligible for research or teaching assistantships.

Applications should be submitted before January 1 to the department admissions committee.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.


5 units, Aut (Taylor)
Win (Clerici-Arias)
Spr (Boskin)

51. Economic Analysis I—(Graduate students register for 151.) The nature of economic systems. Methods of allocating economic resources. Theories of production and consumer choice. The role of markets and prices in a decentralized system. Principles of efficient and equitable allocation. Calculus is used to develop theoretical structures appropriate for doing modern applied economic analysis. Prerequisites: 1 and 180 (or Math. 43 or equivalent).

5 units, Aut (Nechyba)
Win (Hammond)
Spr (Lisboa)

52. Economic Analysis II—(Graduate students register for 152.) Analysis of growth and fluctuations in the economic system as a whole. National accounts and aggregate relationships among stocks and flows in markets for goods, labor, and financial assets. Role of macroeconomic policy in short and long runs. Prerequisite: 51.

5 units, Aut (Weerapana)
Win (Haak)
Spr (Jones)

80. Introduction to Statistical Methods (Postcalculus) for Social Scientists—(Same as Statistics 190.) Introduction to statistical methods relevant to the social sciences. Emphasis is on description and examples of the use of statistical techniques. Three components: probability (basic rules of probability, counting, conditional probability, discrete and continuous probability distributions); statistical inference (point estimation, tests of hypotheses, confidence intervals, large-sample methods); and linear regression models. Prerequisite: Math. 41 or equivalent. GER:2c (DR:4)

3-5 units, Aut (Switzer, Bloch)
Win (Ryu)
Spr (Donaldson)

90. Introduction to Accounting—(Graduate students register for 190.) Introduction to the principles and concepts underlying financial reports: the income statement, statement of financial position, the "funds" statement, and the uses of such reports. No prior accounting is assumed.

5 units, Aut (Kasznik)
Win (Nelson)
91. Introduction to Cost Accounting—(Graduate students register for 191.) The use of internal financial data for managerial decision making.

5 units, Win (Canellos)


5 units, Win (Meier)


5 units, Win (Lisboa)

101. Economic Policy Analysis—Develops skills in economic policy analysis, writing, and oral presentation. Topics vary with instructor. Limited enrollment. Prerequisites: requirements 4 and 5 above. (WIM)

5 units, Aut (Ozden, Topper)
Win (Rothwell, Clerici-Arias)
Spr (Rozelle, Voth)


5 units, Aut (Fafchamps)
Win (Royalty)
Spr (Kocher)

103. Applied Macroeconomic Analysis—Construction and use of econometric models for analyzing macroeconomic phenomena. Students complete individual projects and core material. Topics vary with the instructor. Limited enrollment. Prerequisites: 52, 102.

5 units, Aut (Horvath)

104. Applied Microeconomic Analysis—Develops skills in the empirical analysis of microeconomic theory, models, and data. Topics vary with instructor. Students complete individual projects and core material. Limited enrollment. Prerequisites: 51, 102.

5 units, Win (Schaffner)
Spr (Rothwell)

105. The World Food Economy—(Same as Food Research 103/203.) Interrelationships among food, population, resources, and economic development. Agricultural and rural development in achieving economic and social progress in low-income nations. Emphasis on public sector decision making as it relates to food policy.

5 units, Win (Falcon, Naylor)


5 units, Aut (Haak)
Win (McKinnon)

113. Technology and Economic Change—The economic causes and consequences of technological change. The historical experience of advanced industrial countries and the more recent experience of less developed economies. Topics: origins of modern industry in the U.S. and Europe, technology and the growth of large-scale organization, latecomers to industrialization (Japan and newly industrializing countries), economic growth and slowdown in mature industrial countries, and present concerns and future prospects (the influence of technology on employment, civilian "spillover" from military R&D, and coping with rapid technological change). GER:3b (DR:9)

5 units, Spr (Rosenberg)

115. European Economic History—Economic changes and growth in Western Europe from the Medieval period to the present. Transformation of Europe from an economically and culturally backward part of the world to the center of the world economy pre-WW I. Topics: attitudes toward technology and science, demography, institutional changes, politics and military technology, and production technology. GER:3b (DR:9)

5 units, Win (Voth)

116. American Economic History—The history of the American economy from colonial times to present. The application of economic analysis to historical issues. Topics: American economic growth in a global context; economics of slavery and the Civil War, industrialization in a land-abundant country; historical causes of the Great Depression; recent U.S. economic performance in historical perspective. Prerequisite: 1. GER:3b (DR:9)

5 units, Aut (Wright)
118. The Economics of Development—The economic problems and policy concerns of developing economies. Theories of economic growth and development, inequality and poverty, agriculture and rural development, fertility, education, the economic role of family. Focuses on economic models rather than case studies. Prerequisite: 51.
5 units, Win (Kochar)

119. Development and Population Interactions in the Third World—(Enroll in Food Research 119/219; graduate studies register for 219.)
5 units (Yotopoulos) not given 1997-98

120. Socialist Economies in Transition—Privatization, restructuring, and institutional change in Eastern Europe and the former Soviet Union. Analysis of property rights, corporate governance, incentives, and resource allocation in socialist and transitional economies. Emphasis is on liberalization and privatization policies (including mass and voucher programs) as the primary instruments to induce changes in behavior.
5 units, not given 1997-98

121. The Economies of Greater China and the World—The structure and development of the economy of the People's Republic of China, Taiwan, and Hong Kong. Topics: interregional and international trade; foreign investment; the role of economy during transition; rural reform policy and development institutions, including markets; local governments and private economic entities; urban and industrial reforms; rural industrialization; progress (or stagnation) in China's poverty belts; population control; and comparisons with other countries in Asia, the socialist bloc, and the rest of the world. Prerequisite: 1. GER:4a (DR:2)
5 units, Win (Rozelle)

122. The Theory of Capitalist Development—Theoretical and historical analysis of the growth and development process of capitalist economies. Focus: analysis of the mechanisms, determinants, and consequences of the process; causes of its unevenness on a world scale; and the question of historical stages in capitalist development. Topics: capital accumulation, income distribution, effective demand, employment and labor supply, technological progress and structural change, international trade and investment, underdevelopment, and the role of the state.
5 units, Aut (Harris)

123. Economic Development in Latin America—(Enroll in Food Research 118/218; graduate students register for 218.)
5 units, Win (Reynolds)

124. The Japanese Economy—Description and analysis of contemporary economic institutions and mechanisms: work organization; structures of information, incentives, distribution, and governance at the corporate firm; industrial organization and corporate grouping; the role of financial institutions and the government. Comparison with corresponding American institutions and relevancy to developing and transforming socialist economies. Prerequisite: 51. GER:4a (DR:2)
5 units, Spr (Qian)

126. Comparative Economic Institutions: The Economics of Transition—Problems in building new economic institutions in countries during the transition from plan to market resource allocation. Topics from economic history and theory, law and economics, and comparative economic systems for the purpose of understanding the creation, evolution, and consequences of alternative economic institutions. Recent experiences in Eastern Europe, Russia, and China analyzed and compared. Prerequisite: 51.
5 units, Spr (Qian)

131. The Development of the Korean Economy—History of the rise of S. Korea as a “Newly Industrialized Economy” from a poor, largely agrarian country in the aftermath of the Korean War. The macroeconomic, sectoral, and trade policies responsible for the success. The role played by public enterprises in the process. Prerequisite: 1.
5 units, not given 1997-98

134. Development of the Newly Industrialized Economies—The development experience of newly industrialized economies including Hong Kong, Singapore, S. Korea, and Taiwan. The reasons for their successful development; compares and contrasts them with one another and with other developing countries.
5 units, not given 1997-98

139D. Directed Reading and Research—(Graduate students register for 239D.)
1-10 units (Staff)

140. Financial Economics—Introduction to modern portfolio theory and corporate finance. Topics: organization of various primary and secondary markets, properties of various financial instruments, including financial futures, mutual funds, the “Capital Asset Pricing Model,” the investment banking industry, and models for pricing options and other contingent claims. Prerequisites: 51, at least one course in regression analysis.
5 units, Aut (Wolak), Spr (Mayer)

141. Public Finance and Fiscal Policy—Effects of government expenditure, borrowing, and taxation on resource allocation, national income and employment, prices, and income distribution. Policy topics: fundamental tax reform (flat tax, consumption taxes), social security reform including privatization proposals, fiscal federalism, externality abatement (pollution, congestion), public investment, and cost-benefit analysis. Prerequisites: 51, 52.
5 units, Win (Rork)
142. The Political Economy of the Federal Budget—(Enroll in Public Policy 196.)  
5 units, Aut (Cogan)

5 units, Win (Earle)

5 units, not given 1997-98

148. Urban Economics—The economics of urban areas. Land use, urban transportation, housing and local taxation, and provision of local public services. The economics of urban problems: poverty, crime, and homelessness. Use of economic theory and basic statistical techniques to understand these issues. Class project. Prerequisites: 51, 80.  
5 units, not given 1997-98

5 units, Win (Milgrom)

150. Economics and Public Policy—(Same as Public Policy 104.) The relationship between microeconomic analysis and public policy making. How economic policy analysis is done and why political leaders regard it as useful but not definitive in making policy decisions. Economic rationales for policy interventions, methods of policy evaluation and the role of benefit-cost analysis, economic models of politics and their application to policy making, and the relationship of income distribution to policy choice. Readings: theoretical foundations of policy making and policy analysis, and applications to the adoption and implementation of programs in several areas. Prerequisite: 51.  
5 units, Win (Noll)

151. Economic Analysis I—(See 51.)

152. Economic Analysis II—(See 52.)

154. Economics of Legal Rules and Institutions—Description and analysis of the existence, design, and consequences of legal rules. Topics: common ideas that run through diverse areas of law, including individual rationality, economic efficiency, conventional and Caisson analyses of externalities, enforcement, costs, and market consequences of legal restrictions on contract terms. Private vs. public enforcement of law, the tradeoff between certainty and severity of punishment, the choice between ex post and ex ante sanctions, and the choice between property and liability rules. Applications: property, intellectual property, contract, criminal, tort, family, and environmental law. Prerequisite: 51.  
5 units, not given 1997-98

155. Environmental and Natural Resource Economics—(Same as Earth Systems 112.) Analysis of economic sources of environmental problems in a market economy and evaluation of alternative policies (regulation, taxation, marketable permits) for dealing with these problems. Regional issues (local air and water pollution, traffic congestion) and global issues (climate change, stratospheric ozone depletion). Economics of natural resource management and protection, emphasizing renewable resources; connections between population growth and the environment. Prerequisite: 51.  
5 units, Spr (Goulder)

156. Economics of Health and Medical Care—(Graduate students register for 256; same as Health Research and Policy 256, Medical Information Sciences 256.) Graduate students with research interests should take 248. Institutional, theoretical, and empirical analysis of problems of health and medical care. Topics: institutions in the health sector; measurement and valuation of health; nonmedical determinants of health; medical technology and technology assessment; demand for medical care and medical insurance; physicians, hospitals, and managed care; international comparisons. Prerequisite: 51 or consent of instructor. Recommended: some background in statistics or mathematics.  
5 units, Aut (McClellan)

157. Imperfect Competition—Extends and develops the basic tools of price theory in the context of U.S. industrial market structure. The application of theoretical models and concepts to the behavior of firms and markets when the conditions of perfect competition are not satisfied. Topics: monopoly, oligopoly, monopolistic competition, concentration measures, international competition, advertising, innovation, externalities, economies of scale, and the role of information in markets. Prerequisite: 51.  
5 units, Spr (Bresnahan)

158. Antitrust and Regulation—The history, economics, and legal background of the institutions under which U.S. industry is subject to government control. Topics: antitrust law and economics; the
159. Law and Economics—(Stanford in Washington.) Seminar on the use of microeconomics to analyze selected areas of substantive law and legal procedure. Topics: the economics of property, contracts, torts, antitrust regulation, crime, etc. Students read/discuss selections from the literature and meet with present and former federal officials, scholars, and practitioners who use economic ideas in the analysis of law and policy. Recommended: familiarity with elementary microeconomic analysis. 5 units, Spr (Owen)

160. Game Theory and Economic Applications—Introduction to noncooperative game theory. Basic concepts: games in normal and extensive forms and their relations, classification of games, and various solutions such as Nash equilibrium, sub-game perfection. Theoretical discussion of concepts illustrated by examples from economics and politics. Prerequisites: 51 and one course in calculus, or consent of instructor. 5 units, Aut (Tadelis)

162. Introduction to Dynamic Economics—The dynamics of the allocation process. Calculus required; develops the mathematical tools needed for dynamic analysis. Topics: intertemporal consumer choice and theory of savings, theory of dynamic efficiency, models of aggregate economic growth and capital accumulation, theories of interest and pricing of capital assets, productivity and growth, intergenerational allocation. Prerequisites: 51 or equivalent, 180. 5 units, not given 1997-98

165. International Economics—Comparative advantage in production and trade among nations; trade policy; the international monetary mechanism; domestic monetary, fiscal, and exchange rate policies and their relationship to foreign trade. Prerequisites: 1, 51, 52. 5 units, Aut (Gilfedder) Spr (Desmet)

180. Mathematics for Economists—Training in areas of mathematics applied to economics. Preparation for 51: for students who have had some calculus but lack a strong mathematical background. Topics: single variable optimization; elementary matrix algebra, determinants, and characteristic roots; quadratic forms; functions of several variables; partial derivatives and differentials; first- and second-order conditions for optimization; maximization subject to equality constraints. Selected applications in economics. Prerequisites: 1, Math. 41 or equivalent. GER: 2c (DR: 4) 5 units, Aut (Hammond) Win (Qian)

181. Optimization and Economic Analysis—The development of optimization techniques, including calculus, linear and nonlinear programming, the calculus of variations, and control theory. Emphasis is on concepts and results rather than techniques and proofs. Examples: static and dynamic theories of the household and the firm, and problems in aggregative planning and control. Prerequisites: 51 and 180, or Math. 43 or equivalent. 5 units, not given 1997-98

185. The Distribution of Income and Wealth—Basic facts about the distribution of income and wealth in the U.S., with comparisons to other advanced countries. Methods of measuring inequality. Statistical distributions and stochastic models. Economic theories of the distribution of income: neoclassical, Marxist, and neo-Keynesian. The relation between wealth and income distribution. Normative theories of just distribution and the limiting effects of incentives on the redistribution of income (may be taken as 285 by graduate students). Prerequisites: 51, 102, one course in calculus. 5 units, not given 1997-98

187. Junior Research Workshop: Economic Growth, Technology, and Population—Preference given to juniors and students in the honors program considering related thesis topics. Introduces economics majors to current research in applied and theoretical economics through team and individual research projects. Determinants of long-run economic growth, especially technology and population. Why do economies such as the U.S. grow at 2 percent per year? Why has Japan grown more rapidly over the last 40 years, and why has India grown more slowly? Enrollment limited to 15. Prerequisite: 51. 5 units, not given 1997-98

190. Introduction to Accounting—(See 90.)

191. Introduction to Cost Accounting—(See 91.)

199D. Directed Reading and Research—Honors. In-depth study of an appropriate question and completion of a thesis of very high quality. Normally written under the direction of a member of the Department of Economics (or a member of some closely related department). (See description of honors program.) Register for at least 1 unit for at least one quarter. Meets first week of Autumn Quarter (see Stanford Daily for details). 1-10 units, Aut, Win, Spr (Royalty)

350. A.M. Thesis

by arrangement
400. Ph.D. Dissertation
by arrangement

A. CORE THEORY CURRICULUM

5 units, Aut (Nechyba)

203. Core Economics III—Noncooperative game theory including normal and extensive forms, solution concepts, games with incomplete information, and repeated games. Externalities and public goods: an introduction to mechanism design. The theory of imperfect competition: static Bertrand and Cournot competition, dynamic oligopoly, entry decisions, entry deterrence, strategic behavior to alter market conditions.
5 units, Win (Bernheim)

204. Core Economics V—Theory of resource allocation over time, competitive equilibrium and intertemporal efficiency, capital asset pricing models, equilibrium with securities, pricing of securities and arbitrage. Overlapping generations models with incomplete market structure and applications. Prerequisite: 203.
5 units, Spr (Kurz)

5 units, Aut (Sargent, Jones)

211. Core Economics IV—Monetary theory: evidence on the nature of economic fluctuations, the role of money (overlapping generations, cash in advance, money in the utility function), the dynamic impact of changes in money on the economy, the natural rate of unemployment and job creation/destruction, exchange rate determination, international transmission of money, dynamic stochastic general equilibrium models. Macroeconomic policy: theoretical rationale or central bank independence, time inconsistency, the impact of public debt, rules vs. discretion, interest rate vs. money rules, international monetary policy coordination, rational expectations econometric policy evaluation.
5 units, Win (Taylor)

212. Core Economics VI—The theory of contracts, emphasizing contractual incompleteness and the problem of moral hazard. Incentive regulation. Competition with imperfect information, including signaling and adverse selection. Investment theory and empirics, including adjustment costs and the q theory; consumption theory and empirics, focusing on the life-cycle model; and the economics of credit constraints facing households and businesses.
5 units, Spr (Milgrom, Hall)

301A,B,C. Workshop in Microeconomics
10 units (Staff)

310A,B,C. Workshop in Macroeconomics
10 units (Staff)

B. ALTERNATIVE APPROACHES TO ECONOMIC ANALYSIS

To receive credit for this field, students must complete two of the following three courses.

200. Topics in the History of Economic Thought—See 100.
5 units, Aut (Lisboa)

219. Value, Distribution, and Accumulation—Conceptual and analytical problems concerning the determination of value, price, distribution, and accumulation in the capitalist economy. Survey of their meaning, significance, and background in the development of economic thought. Focus is on the analytic treatment of these problems. Consideration of the specific approaches of Classical and Marxian economic theory, their recent elaboration and extension, Keynesian-Marxian syntheses, and comparison with relevant elements of Neoclassical theory.
5 units, not given 1997-98

220. Marxian Economic Theory—Systematic examination of Marxian economic theory regarding the analysis of value and surplus value, prices and profits, the circuits of capital, reproduction, accumulation, technical change, and economic crises. Focus is on recent elaborations, extensions, and applications of the theory.
5 units, not given 1997-98

395A,B,C. Workshop in Alternative Approaches to Economic Analysis
10 units (Staff)

C. ECONOMIC DEVELOPMENT

To receive comprehensive credit in the field, students must complete any two from 214, 215, or 216 and submit an additional paper. Students wishing to do research in the field are strongly advised to take 267, as well as supporting work in international economics and comparative institutional analysis.

214. Microeconomic Issues in Economic Development—Micro-economic problems of developing economies, emphasizing the rural agrarian. Top
ics: determination of income, models of savings, role of the household, and issues relating to health, nutrition, and education. Emphasis is on empirical tests of theoretical models and empirical evidence on these issues.

5 units, Win (Kochar)

215. Industrialization, Growth, and Economic Development—The process of economic development from a theoretical and empirical perspective. Topics: the sources of economic growth; industrialization and structural change; catching-up; location and investment; risk taking, investment, and market institutions; non-market exchange and the emergence of markets; the role of trust and reputation in market formation; markets for industrial inputs, credit, and equity.

5 units, Aut (Fafchamps)

216. The Macroeconomics of Economic Development and Growth—The historical experience of economic development; patterns of economic growth; sources of economic growth; models of economic development (two-gap models, dual economy models, open economy models, "new" growth models), saving and capital accumulation; the role of money and finance; inflation; taxation; stabilization in closed and open economies with incomplete and/or imperfect markets; human and other forms of intangible capital; infrastructural capital; and externalities.

5 units, not given 1997-98


5 units, Spr (Lau)

218. Special Topics in International Economics—See section T below.

5 units, Spr (Krueger)

315A,B,C. Workshop in Economic Development 10 units (Staff)

D. ECONOMIC HISTORY

The requirements for the field are (1) a comprehensive exam in Spring Quarter based on material from at least two of the courses listed below, and (2) one research paper on a subject approved by one of the faculty teaching any of the following five courses.

224. Science and Technology in Economic Growth—Upper-division undergraduates may attend with consent of instructor. The roles played by the growth of scientific knowledge and technical progress in the development of industrial societies. Emphasis is on the interactions between science and technology, and the organizational factors which have influenced their effectiveness in contributing to productivity growth.

5 units, Win (Rosenberg)

225. Technology, Economy, and Society—Determinants and consequences of technological innovations in the economic history of the West from the 9th to the 19th centuries. Selected "clusters" of technical innovations in production and warfare are examined for the determinants of the rate and bias of innovative activity, economic and cultural conditions governing diffusion, and the problems of identifying and measuring primary and second-order economic consequences.

5 units, not given 1997-98


5 units, Aut (Wright)

227. European Economic History—Economic growth and development in Western Europe from the 11th to the 20th centuries, emphasizing the formative period up to the 19th century. Emphasis on the experiences of Britain, France, Germany, and Italy. The interrelations between the growth and distribution of output, demographic trends, technological and organizational changes in trade and industry, and the changing formal and informal institutions governing political and economic activity.

5 units, Spr (Greif)

228. Institutions in Economic History: Form, Function, and Evolution—See 294.

5 units, not given 1997-98

325A,B,C. Workshop in Economic History 10 units (Staff)

MONETARY THEORY AND ADVANCED MACROECONOMICS

Requirements for the field are successful completion of 233 and 234.


5 units, Win (Sargent)

234. Advanced Macroeconomics II—Topics in the theory of fluctuations and growth.

5 units, Spr (Taylor)

F. PUBLIC FINANCE

To receive credit for the field, students must complete 241 and 242 by passing the final examinations, and submit an acceptable research pa-

241. 5 units, Win (Nechyba)
242. 5 units, Spr (Bernheim)

243. Economics of the Environment—Upper-division undergraduates may attend with consent of instructor. Analysis of sources of environmental problems in market economies and of policy options for addressing these problems. Topics: choice of policy instruments (taxes, standards, tradeable permits), environmental risk assessment, valuation of non-marketed commodities (environmental amenities, biodiversity), environmental policy making under uncertainty, optimal mix of corrective and distortionary tax instruments, and dynamics of economic growth in the presence of non-reproducible natural resources.

5 units, Aut (Goulder)

341A, B, C. Workshop on the Economics of the Public Sector—Issues in measuring and evaluating the economic performance of government tax, expenditure, debt, and other policies; their effects on private economic activity, saving, investment, labor supply, etc.; alternative policies and methods of evaluation. Workshop format combines student research, faculty presentations, and guest speakers. Prerequisite: 241 or consent of instructor.

10 units (Staff)

354A, B, C. Workshop in Law and Economics 6 units, Win, Spr

G. ECONOMICS OF LABOR

To receive credit for the field, students must successfully complete two from 246, 247, and 248.


5 units, Win (Pencavel)


5 units, Spr (MacCurdy)

248. Health, Medical Care, and Aging—Introduction to current research and policy issues in the economics of health, medical care, and aging. Topics: technological change; demand for medical care; behavior of physicians, hospitals, and health plans; analysis of insurance markets; effects of health and health insurance on labor supply; health risks and individual behavior; economic demography; political economy of the health care sector. Emphasis on the development and estimation of microeconomic models.

5 units, not given 1997-98

345A, B, C. Workshop on Economics of Factor Markets 10 units (Staff)

H. ECONOMICS OF INDUSTRY

To receive credit for the field, students must successfully complete 257 and 258 and submit one research paper, the subject of which has been approved in advance by one of the faculty teaching 257, 258, or 260.

256. Economics of Health and Medical Care—See 156.

257, 258. The Economics of Industry, Regulation, and Firm Organizations I and II—Theoretical and empirical analyses of the determinants of market structure; firm behavior and market efficiency in oligopolies; theory and practice of pro-competitive government policies; the relationship of product quality and technological innovation to market structure; internal organizations of the firm; choices between contracting and vertical integrating; government regulation of business; public utilities, regulated competition, licensing, product and worker safety, environmental protection; the political economy of business policies.

257. 5 units, Aut (Bresnahan, Noll, Wolak)
258. 5 units, Win (Bresnahan, Noll, Wolak)

260. Special Topics in Industrial Organization and Regulation—Focused, in-depth study of issues of current research and policy interest: empirical tests of oligopoly theories; dynamics of change in regulatory policy; theory of economic institutions; antitrust status of joint ventures; and use of capacity, innovation, and product variety as a barrier to entry. Significant research issues that remain unresolved and promising ways to attack them.

5 units, Spr (Bresnahan, Noll, Wolak)

262. Experimental Methods of Institutional Analysis—Use and design of laboratory methods to test theories of individual behavior in various institutional settings, including markets, small groups, and political processes. Readings/lectures on methods of experimental research and the current state of research findings, and individual research projects in which students design and run an experiment.

3 units, not given 1997-98
ECONOMICS 447

303A,B,C. Workshop in the Economics of Science and Technology—Sponsored by the department and the Center for Economic Policy Research. Focuses on applied studies and policy issues relating to resource allocation and organization of basic science and engineering research, commercialization of scientific knowledge, diffusion of technological and organizational innovations, and impacts on productivity and economic welfare in the U.S. and other industrially advanced economies.
10 units, Aut, Win, Spr (Staff)

355A,B,C. Workshop in Industrial Organization, Regulation, and Applied Microeconomics—Working seminar on current research in the field by visitors, presentations by students, and structured discussion of recent papers. Students are required to write an original research paper, make a formal seminar presentation, and lead a structured discussion.
10 units, Aut, Win, Spr (Staff)

358A,B,C. Workshop in Political Economics and Collective Choice—Multidisciplinary working seminar on current topics in mechanisms of social choice, political processes, and the politics of economic policy. Offered in collaboration with the Graduate School of Business and the Department of Political Science. Participants are required to undertake an original research project, approved by the instructors, and to make an oral presentation.
10 units, Aut, Win, Spr (Staff)

I. INTERNATIONAL ECONOMICS
To receive comprehensive credit in this field, students must complete 265 and 266 and one additional paper. Special topics course 267 is strongly recommended. For students doing research in the field, further supporting courses are found in the fields of economic development, industrial organization, and public finance.

5 units, Aut (McKinnon)

5 units, Win (Krueger)

5 units, Spr (Krueger)

365A,B,C. Workshop in International Economics
10 units (Staff)

J. ECONOMETRICS
All Ph.D. students are required to take 270, 271, 272.
To receive credit in the econometrics field, students must complete 273, and either 274 or 275.

270. Intermediate Econometrics I—Probability, random variables, and distributions; large sample theory; theory of estimation and hypothesis testing. Prerequisites: math and knowledge of probability at the level of Chapter 2, Paul G. Hoel, Introduction to Mathematical Statistics, 5th ed.
5 units, Win (Wolak)

271. Intermediate Econometrics II—Linear regression model, relaxation of classical-regression assumptions, simultaneous equation models, linear time series analysis. Prerequisite: 270.
5 units, Win (Wolak)

5 units, Spr (MacCurdy)

273. Advanced Econometrics I—Large sample theory; maximum likelihood estimation; non-linear least squares; generalized least squares. Prerequisites: 272, Math. 113.
5 units, Spr (Amemiya)

274. Limited Dependent Variables—Discrete choice models, Tobit models; Markov chain and duration models. Prerequisite: 273 or consent of instructor.
5 units, Win (Ryu)

5 units, Spr (Horvath)

276. Special Topics in Econometrics—Possible subjects: robust estimation, stochastic control, prediction theory, Bayesian analysis, factor analysis, pooling of time series and cross section data. Prerequisite: 273.
5 units, not given 1997-98

370A,B,C. Workshop in Econometrics
10 units (Staff)
K. MATHEMATICAL ECONOMICS

To receive credit in the mathematical economics field, students must complete two courses from 280, 281, 282, 284, 286, or 287.

5 units, not given 1997-98

5 units, not given 1997-98

5 units, Spr (Hammond, Lisboa)

284. Topics in Dynamic Economics—Principle of optimality, discounted dynamic programming under certainty and uncertainty, and applications in economics. Bayesian models of learning and expectation formation. Theory of Rational Beliefs and Endogenous Uncertainty. Develops extensive mathematical tools used in applications.
5 units, Win (Kurz)

285. The Distribution of Income and Wealth—(See 185.)
5 units, not given 1997-98

286. Game Theory and Economic Application—Non-cooperative games, games in extensive and normal forms, games with incomplete information, Nash equilibrium and refinements, repeated games, signaling games, non-Nash solution concepts. Cooperative games, the characteristic function and core. Applications and current selected research.
5 units, Spr (Milgrom)

287. General Equilibrium Theory—Existence, efficiency, and core equivalence of Walrasian equilibrium in exchange economies. Production, financial markets, overlapping generations, sequence economies with infinitely-lived agents. Prerequisites: 202, 203, 204, or consent of instructor.
5 units, Aut (Hammond, Lisboa)

288. Computational Economics—Computational approaches to solving economic problems. Overview of numerical analysis. Economic problems in computationally tractable forms, and the use of numerical analysis techniques to solve them. Examples of problems solved numerically (general equilibrium models, optimal taxation, dynamic programming, economic growth, life-cycle models, intervention in commodity markets, Bayesian econometrics, equilibria of dynamic and repeated games, and nonlinear rational expectations equilibria with asymmetric information). Prerequisite: equivalent of first-year graduate core economics sequence.
5 units, not given 1997-98

290. Multiperson Decision Theory—(Same as Business 608.) Review of working papers emphasizing methods of game theory and topics in mathematical economics that use game-theoretic models. The effects of differences in information, limitations on observability and contracts, etc., on strategic behavior. Prerequisites: two courses from the Choice Theory/Mathematics Economics sequences, or consent of instructor.
5 units, Spr (Wilson)

385A,B,C. Workshop in Mathematical Economics
10 units (Staff)

386. Interdisciplinary Seminar on Conflict Resolution—(Same as Law 325, Engineering-Economics Systems and Operations Research 489, Psychology 283.) Addresses problems of conflict resolution and negotiation from an interdisciplinary perspective. Presentations by faculty and by scholars from other universities.
1-2 units, Win, (Arrow, Ross, Wilson, Alexander)

L. COMPARATIVE INSTITUTIONAL ANALYSIS

To receive credit for this field, students are required to take 291 and then select at least one of: 292, 293, or 294. Students expecting to make Comparative Institutional Analysis their primary field are also required to take the workshop (391).

291. Contracts and Organizations—General issues and methods in studying contracts, organizations, and institutions. Topics: coordination, contracting with adverse selection, contracting with moral hazard; contracting with many agents, problems of information and commitment, contract renegotiation, incomplete contracts, repeated interactions and reputation, collusion, rent-seeking and influence activities, applications to firms, partnerships, political entities, etc.
5 units, Aut (Tadelis)

292. Comparative Analysis of Organizations and Institutions—Game theoretic conceptualization of institutions. Game theoretic and information theo-
etic analysis of various institutions e.g., property rights, organizational conventions, corporate governance, social norms, financial institutions, enforcement institutions, and their temporal and cross sectional linkage. Mechanisms of institutional change.

5 units, Spr (Aoki)

293. Reform and Transition in Socialist Economies—Applications of organization theory to problems in reforming socialist economies. Emphasis is on understanding problems in the creation of market institutions in China, Eastern Europe, and the territory of the former U.S.S.R. Theoretical topics: coordination, incentives, commitment problems, and contract enforcement. These problems are related to issues in privatization, the building of fiscal and financial institutions, international trade, and foreign investments.

5 units, Spr (Qian)

294. Institutions and Organizations in Historical Perspective—(Same as 228.) Description and analysis of institutions and organizations in the Western historical experience, emphasizing the formative period from the 11th to the 18th centuries. Discussion of the formation, function, and evolution of institutions highlights alternative conceptual frameworks—neoclassical, transaction cost economics, institutionalism, and Marxism and neo-Marxism, while utilizing game theory, mechanism design, contract theory, etc. Topics: institutions related to trade organization, the organization of production, feudalism, mercantilism, and the state.

5 units, not given 1997-98

391A,B,C. Seminar in Comparative Institutional Analysis

10 units (Staff)

OVERSEAS STUDIES

The following courses are approved for the Economics major and taught overseas at the campus indicated. Students are encouraged to discuss with their major advisers on campus which courses would best meet individual educational needs. Descriptions can be found in the “Overseas Studies” section of this bulletin or in the Overseas Studies Program office, 126 Sweet Hall.

BERLIN

100X. The History of German and European Economic Philosophy
4-5 units, Spr (Krüger)

127X. The Political Economy of Contemporary Germany
4-5 units, Aut (Krüger)

128X. Transition in Germany and Eastern Europe
4-5 units, Win (Krueger)

FLORENCE

115X. The Economic History of Italy in the Premodern Period
5 units, Aut (Greif)

117X. Topics in the Economic History of Modern Italy
5 units, Aut (Greif)

159X. The Political Economy of Industrial Change: Italy and Europe in a Global System
5 units, Win (Bellini)

167X. The Integration of Europe—(Same as Overseas Studies 145X.)
4-5 units, Aut (D’Alimonte)

MOSCOW

120X. Economic Reform and Economic Policy in Modern Russia
5 units, Aut (Mau)

OXFORD

167X. The Economies of the New Europe: East Meets West
5 units, Win (Josling)

168X. The Economic Organization of Science and Technology in the West since 1600
5 units, Spr (David)

PARIS

122X. 20th-Century French and European Economies
5 units, Aut (Balleix)

PUEBLA

118X. Developmental Macroeconomics: The Mexican Case—(Same as Overseas Studies 114X.)
5 units, Win (Cárdenas)

SANTIAGO

163X. Latin America in the International Economy—(Same as Overseas Studies 129X.)
5 units, Win (Ffrench-Davis)

165X. Latin American Economies in Transition—(Same as Overseas Studies 130X.)
5 units, Aut (Muñoz)

ENGLISH

The Department of English offers work in English and American literature, other literature written in English, English philology, creative writing, and expository writing. In connection with these programs, it maintains the William Dinsmore Briggs Memorial Library for the use of graduate students and the Jones Room as a center for its work in Creative Writing.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The English major is designed to provide students with both an understanding of the historical development of English literature and an appreciation of the variety and richness of literary texts. It offers a vigorous training in interpretive thinking and precise expression.

PREPARATION FOR THE MAJOR

Before declaring an English major, students should have satisfied the University writing requirement.

The following departmental requirements are in addition to the University’s basic requirements for the bachelor’s degree. Any two of the required courses may be taken on a Satisfactory/No Credit basis at the discretion of the instructor, but students intending to go on to graduate school should weigh the fact that a grade of satisfactory provides little evidence of their abilities.

MAJOR PROGRAMS OF STUDY IN ENGLISH

Because the Department of English recognizes that the needs and interests of literature students vary, it has approved several major programs of study in English. Each of these has different objectives and requirements; students should consider carefully which major corresponds most closely to their personal and professional objectives.

Major in English—This program provides for the interests of students who wish to understand the full variety and historical development of English and American literature over the centuries. It is recommended to prospective candidates for admission to graduate schools of English. Of particular value to students selecting this major are courses with broad historical perspectives on literature and language and courses which concentrate on major writers. Students must choose one 5-unit course from each of the following eight areas. A student who took a 3 unit sub-100 English course while still a non-major may count it retroactively towards the elective requirement for the major. Only one such course may be applied to the major. If possible, students should take courses in chronological sequence.

B) Medieval: 165A, 165B, 171, 181E, 211
C) Renaissance: 113, 172, 182, 182E, 182H
D) Shakespeare: 85Q, 173B, 173C, 173F
E) Restoration and 18th Century: 131, 163G, 215D, 242
At least one of the courses satisfying the major must be English 180-189 (Seminars for English Majors) or English 196 (Honors Seminar) or an English seminar offered in the Stanford in Oxford program at St. Catherine's College. Other English courses which are taught in a seminar format and require a substantial amount of critical writing may be approved by the director of undergraduate studies on a case by case basis. Students are urged not to postpone satisfying this requirement until late in their major career. Undue tardiness may result in a delay of degree conferral.

In addition, students must elect three additional courses from among those offered by the Department of English (excluding only English 1-2-3, 5, 7-8-9, and advanced composition courses). In place of one of these elective courses, students may choose one upper-division course in a foreign literature read in the original language.

Students may apply as many as four English courses taken at other approved universities towards their major.

Foreign Language Requirement—Students declaring an English major during Autumn Quarter, 1996, or thereafter are not required to demonstrate proficiency in a foreign language at a higher level than that mandated by the University. However, students who plan to study English literature at the graduate level should be aware that advanced reading skills in one or more foreign languages enhance their chances of admission to and success in most Ph.D. programs.

Students who declared English prior to Autumn Quarter, 1996 must pass a fourth quarter language other than a "conversation" course (for example, French 22) or demonstrate equivalent knowledge (that is, a placement exam). For information about placement exams, contact individual language departments. Students who take a placement exam should ask the coordinator in the department administering the exam to send official verification of exam results to the undergraduate English coordinator.

**EMPHASES IN THE ENGLISH MAJOR**

**English with a Creative Writing Emphasis**—This program is designed for students who want a solid background in the English literary tradition as a whole and at the same time want to develop skills in writing poetry or fiction. Students must take a total of 12 courses offered through the Department of English and the Program in Creative Writing. As do all English majors, they must choose one course from each of the eight areas B-H and P listed above, and fulfill the seminar requirement.

In addition, they must take four courses specifically designed for either the fiction or the poetry concentration. Fiction writers must first take English 90 (Fiction Writing), then two quarters of 190 (Intermediate Fiction Writing) or a more advanced fiction writing course, and 137 (Development of the Short Story). Poets must first take English 92, then two quarters of 192 (Intermediate Poetry Writing) or a more advanced poetry writing course, and one course in poetry in addition to the course that fulfills area requirement P, to be approved by a poetry instructor in the Creative Writing program. Courses taken to satisfy an area requirement cannot also satisfy a Creative Writing requirement. Students should note that they cannot anticipate completing the Creative Writing emphasis until they have been accepted either to 190 or 192.

Admission to English 190, 192, 290, 290A, and 292 is by consent of the instructor and is based on the quality of the student’s work. Admission to a single quarter of 190 or 192 does not guarantee admission to a second quarter of 190 or 192. Students should submit a manuscript to the Creative Writing office by the last day of the preceding quarter, and in the case of Autumn Quarter, no later than one week before the beginning of the quarter. Students not admitted to the intermediate courses may take the introductory course a second time.

**English with Interdisciplinary Emphasis**—This major is intended for students who wish to combine the study of literature of one broadly defined historical period with an interdisciplinary program of courses relevant to that literature. Students are required to fulfill the language and seminar requirements listed under the major in English and to take a total of 15 courses distributed as follows:

1. One course in area P, Poetry and Poetics.
2. Five courses in one of the two areas of emphasis:
   a) Medieval and Renaissance Literature: students must take one course in each of the areas B, C, and D and both English 111 and 112*.
   b) English and American Literature from the Enlightenment to the Present: students must take one course in each of the areas E, F, G, and H and English 110*.
3. Three elective English courses in the area of emphasis.
4. Six courses related to the literature of the chosen period from such disciplines as anthropology,
the arts (including the practice of one of the arts), classics, comparative literature, European or other literature, feminist studies, history, modern thought and literature, political science, and African-American studies. These six courses should form a coherent program and they must be relevant to the historical focus of the courses chosen by the student to meet requirement. Each of these six courses must be approved in advance by the interdisciplinary program director.

5. In addition, students in the interdisciplinary program must write at least one interdisciplinary paper. This may be a senior honors essay (197), a senior independent essay (199), an individual research paper (194 or 198), or a paper integrating the material in two courses the student is taking in two different disciplines.

* Two more focused courses may be substituted for each of the courses 110, 111, and 112, by consent of the student’s adviser in the interdisciplinary major.

MINORS

The minor in English offers some flexibility for those students who want to pursue specific interests within English and American Literature, while still requiring certain courses that ensure coverage of a variety of periods, genres, and methods of studying literature.

1. Either English 150 (the course “Poetry and Poetics”) or a course in literary theory (the 166 series)
2. One course in American literature written before 1900
3. Three courses in either of the following configurations:
   a) English 110—Chaucer, Shakespeare, Milton, and Their Contemporaries
      A course in English literature written between 1700 and 1900
      A course in English literature written after 1900
   b) English 111—From the Enlightenment to the Modern Period
      A course in English literature written before 1500
      A course in English literature written between 1500 and 1700
4. Two elective courses in English literature originally written in English. One of these may be a course in Creative Writing.

* "English Literature" here means literature of the British Isles.

INTERDEPARTMENTAL MAJORS

English and French Literatures—This major provides a focus in English literature with additional work in French literature. Candidates for the A.B. in English and French Literatures complete eight courses in English, one from each of the areas B-H and P listed under the major in English, and fulfill the seminar requirement. In addition, they must complete a coherent program of four courses in French literature, read in the original. The program of each student must be approved by the Director of Undergraduate Studies in English and by the Department of French and Italian.

English and German Literatures—Candidates for the A.B. in this major must complete a program exactly analogous to the preceding major, with eight courses in English, and a coherent program of four courses in German literature, read in the original, with approval by the departments involved as specified above.

English and Italian Literatures—Candidates for the A.B. in this major must complete eight courses in English, and a coherent program of four courses in Italian literature, read in the original, with approval by the departments involved as specified above.

English and Spanish or Spanish-American Literatures—Candidates for the A.B. in this major must complete eight courses in English, and a coherent program of four courses in Spanish or Spanish-American literatures, read in the original, with approval by the departments involved as specified above.

ADVANCED WORK

INDIVIDUAL RESEARCH

Students taking 100- or 200-level courses may, with the consent of the instructor, write a follow-up 5-unit paper based on the course material and due no later than the end of the succeeding quarter (register for 194). The research paper is written under the direct supervision of the professor; it must be submitted first in a preliminary draft and subsequently in a final version.

INTEGRATED WORK

Students taking (either simultaneously or consecutively) two or three courses which have a clear thematic or historical relationship to each other may, with the consent of the relevant instructors, write one large-scale paper of 7,000-10,000 words integrating the material in the courses in question.

SENIOR INDEPENDENT STUDY

Independent study is open, on approval by the department, to seniors majoring in English who wish to work throughout the year on a critical or scholarly essay of about 10,000 words. In rare circumstances, advisers may nominate exceptional students for honors if the student’s thesis is outstanding and the program of study has been approximately equivalent to that required of regular honors students.

HONORS PROGRAM

Students who wish to undertake a more extensive program in English literature, including tu-
In the junior year, students may choose between the following two options: (1) at Oxford, take two quarters of the seminar sequence offered by St. Catherine’s College, or at least 10 units of tutorial work arranged by the director of the Oxford program; (2) at Stanford, take 10 units of tutorial work in the Department of English. Students who elect the latter option select two regular English lecture courses, registering for 3 rather than 5 units. With each course they also take a 5-unit tutorial (196T) on the same or related material with an advanced graduate student.

The courses taken at Oxford or at Stanford to satisfy this requirement for the honors program can also be used where appropriate to satisfy the area requirements for the English major.

In the senior year, honors students complete the senior honors essays for 10 units under supervision of a faculty adviser. In Autumn Quarter, honors students take a 5-unit senior honors seminar on critical approaches to literature. (Students who have previously taken an upper-division course in literary theory and criticism may be exempted from this seminar on request and with the approval of the director of the honors program). In Winter Quarter, all honors students take a 3-unit essay workshop focused on the process of researching and writing the essay. The deadline for submitting the honors essay is May 15.

Students in the honors program complete the following:

Area Requirements (B-H, P)—eight courses
Two tutorials—10 units
Senior seminar and workshop—8 units total
Senior Honors Essay—10 units
Three electives

Note—For other opportunities for extended essay projects, see Senior Independent Essay and English 194 and 199.

HONORS PROGRAM IN HUMANITIES

An honors program in Humanities is available for English majors who wish to supplement the major by a related and carefully guided program of studies. See the “Humanities Special Programs” section of this bulletin for a description of the program. Students wishing to take the Comparative Literature option within the honors program in Humanities should see the “Comparative Literature” section of this bulletin.

VISITING STUDENTS

Students who do not wish to become candidates for a graduate degree, but who are qualified to meet the standards of admission to a master’s or Ph.D. program, may apply to Graduate Admissions, Registrar’s Office, Stanford University, for admission as nonmatriculated students for a period of not more than three consecutive quarters. Each quarter they may take up to three English courses numbered 101 to 299, or two such courses and (with the consent of the instructor) one English course numbered above 300.

GRADUATE PROGRAMS

For University regulations governing advanced degrees, see the “Graduate Degrees” section of this bulletin.

Eligibility—Students with a bachelor’s degree of acceptable quality may apply to pursue graduate work toward an advanced degree in English at Stanford. (Formal application for candidacy is a separate step taken somewhat later.) Students whose previous preparation is in a field other than English are expected to make up deficiencies. Credits for previous graduate work at Stanford or elsewhere more than five years old may be reevaluated or rejected.

Graduate students are admitted as candidates for only the Ph.D. or the A.M. in English and American Literature. The A.M. is a one-year program without financial aid. A.M. students may apply to the Ph.D. program.

MASTER OF ARTS

Candidates may earn the master’s degree in English and American Literature by satisfying the following requirements:

1. Successful completion with a ‘B’ grade point average (GPA) of nine courses (normally 45 units) including at least two 300-level courses. Ordinarily, graduate students enroll in courses numbered 200 and above. They may take no more than three courses numbered 101-199 without the consent of the Director of Graduate Studies. The master’s student may take no more than 10 units of directed reading and research (English 398). Interested students should consult their faculty adviser or the Graduate Program Adviser for further details.

During the first two weeks of the first quarter, candidates for the master’s degree in English and American Literature should consult the adviser designated by the Director of Graduate Studies in order to draw up a three-quarter study plan. Normally, the student should take one course each from the following five fields: Medieval, Renaissance, 18th Century and Ro-
The program should also contain four additional courses, representing a mixture of survey and specialized courses chosen to guarantee familiarity with a reasonable proportion of works on the reading list for doctoral candidates. Normally, no more than two courses taken outside the department may be counted toward the degree, but the Graduate Studies Committee considers exceptions.

Candidates who can demonstrate unusually strong preparation in the history of English literature may undertake a 40-to-60-page master's thesis. Such candidates may register for up to 15 units of English 399 with the faculty member who supervises the work on the thesis. Candidates who write a master's thesis may petition to be excused from up to 15 units of the requirements described above. The additional 30 units normally consist of the five required courses and one additional course. These courses are chosen by the student and approved by the adviser and the Director of Graduate Studies.

2. Demonstration of a reading knowledge of one foreign language. (For ways of fulfilling this requirement, see the section below on language requirements for the Ph.D.)

Candidates for a coterminal master's degree must fulfill all requirements for the A.M. in English (including the language requirement), as well as general and major requirements for the A.B. in English. A minimum GPA of 3.5 in the major is required of those applying for the coterminal master's degree. No courses used to satisfy the A.B. requirements (either as General Education Requirements or department requirements) may be applied toward the A.M. However, additional undergraduate units not applied to any previous degree may be applied toward the A.M. See the description of programs under the "Undergraduate Degrees" section of this bulletin.

MASTER OF ARTS IN TEACHING

The A.M. in Teaching is offered jointly by this department and the School of Education. The degree is intended for candidates who have a teaching credential or relevant teaching experience and wish to further strengthen their academic preparation. The program consists of a minimum of 25 units in the teaching field and 12 units in the School of Education. Detailed requirements for the course are outlined in the "School of Education" section of this bulletin.

Candidates for the A.M. in Teaching may also qualify for the State of California Community College Instructor Credential by completing additional units of academic work at the graduate level. For further information, consult the Credentials Administrator, room 110, School of Education, early in the Autumn Quarter.

DOCTOR OF PHILOSOPHY

University regulations regarding this degree are discussed in the "Graduate Degrees" section of this bulletin. The following department requirements, dealing with such matters as residence, dissertation, and examinations, are in addition to the University's basic requirements for the doctorate. (Students should consult the most recent edition of "Informal Notes: Procedures for the Ph.D." Copies are available in the English Graduate Studies office.)

A candidate for the Ph.D. degree must complete three years (nine quarters) of full-time work, or the equivalent, in graduate study beyond the baccalaureate degree. Candidates are expected to offer at least 97 units of graduate work in addition to the doctoral dissertation. At least three consecutive quarters of graduate work, and the final course work in the doctoral program, must be taken at Stanford.

Toward the 97 course units currently required for the Ph.D., a student may count no more than 20 units of English 398 without the written consent of the Director of Graduate Studies. A student takes at least 70 graded units (normally 14 courses) of the 97 normally required total units (397, 398, and 399 do not count toward the 70 graded units). No more than 15 units (normally three courses) may come from 100-level courses. When graduate students are teaching 50-percent time, one of these three courses may be taken for 4 units.

This program is designed to be completed in five years. Six sections of supervised teaching (four as a teaching assistant in a literature course and two as the instructor of a Writing and Critical Thinking course) are a requirement of the Ph.D. program.

Those students who began their Ph.D. program prior to September 1992 enroll in the Teachers' Workshop courses (397A, B, and C) in their second year. A candidate may take the Ph.D. degree in English Literature, in English and American Literature, in English and Comparative Literature, or in English and Humanities.
ENGLISH LITERATURE

Requirements are as follows:

1. A course in Old English; or a course in the history of the English language; or a course in an earlier historical form of a foreign language with a bearing on English literature and language, such as Old French or Old High German; and a course in Middle English.

2. A minimum of six courses for a letter grade from the graduate colloquia and graduate seminars, of which at least three must be graduate seminars. The colloquia and seminars should be from different genres and periods as approved by the adviser.

3. Students who began their Ph.D. course in September 1992, or thereafter, are required to take a 5-unit course, Introduction to Graduate Study, and a 2-unit laboratory in pedagogy.

4. In the second year, students who began their Ph.D. course in September 1992, or thereafter, are required to complete in Autumn Quarter, a Teachers' Workshop, which includes the Apprentice Teaching Program described above, and a Teachers' Workshop in Winter Quarter. There are no units associated with this work.

Students who entered the Ph.D. program prior to September 1992 are required to have taken in their second year a 5-unit course introducing the new graduate student to the various opportunities and responsibilities of the department.

5. Students are encouraged to take an advanced course in literary theory or criticism.

6. A minimum of 25 additional units of graduate courses and seminars (excluding 396, 397, 398, and 399) distributed according to the adviser's judgment and the candidate's needs. A student may receive graduate credit for three 100-level courses in the Department of English.

7. Consent of the adviser if courses taken outside the Department of English are to count toward the 97-unit requirement.

8. An oral qualifying examination based on a reading guide, to be taken at the end of the summer after the first year of graduate work. The final decision as to qualification is made by the Graduate Studies Committee in consideration of the student's course record in conjunction with performance in the examination.

A student coming to the doctoral program who has done graduate work at another university must petition in the first year at Stanford for transfer credit for course work completed elsewhere. The petition should list the courses and grades and describe the nature and scope of course work, as well as the content, contact hours, and writing requirements. A syllabus must be included. The Director of Graduate Studies considers the petition in conjunction with the student's grades.

A student who has isolated a topic or area which seems promising for a doctoral thesis subject and who wants to explore it right away, and to incur additional specific course requirements insuring coverage and balance in program, may petition on entrance to qualify on the recommendation of a committee of advisers who would oversee and evaluate a full year's course of study. Such petitions are rigorously scrutinized by the Graduate Studies Committee and granted only in exceptional cases.

9. A University oral examination to be taken no later than the Winter Quarter of the student's third year of graduate work. This examination covers the field of concentration as defined by the student and the student's adviser.

ENGLISH AND AMERICAN LITERATURE

Requirements are as follows:

1. A course in Old English; or a course in the history of the English language; or a course in an earlier historical form of a foreign language with a bearing on English literature and language, such as Old French or Old High German; and a course in Middle English.

2. A minimum of 35 units of graduate courses in American literature and 35 units in English. Among these, a minimum of six courses for a letter grade from the graduate colloquia and graduate seminars, of which three must be in American literature, and of which at least three must be graduate seminars. The colloquia and seminars should be in different genres and periods as approved by the adviser.

3. Students who began their Ph.D. course in September 1992, or thereafter, are required to take a 5-unit course, Introduction to Graduate Study, and a 2-unit laboratory in pedagogy.

Students who entered the Ph.D. program prior to September 1992 are required to have taken in their second year a 5-unit course on teaching composition (397A) in Autumn Quarter, which includes the Apprenticeship Teaching Program, and the Teachers' Workshop courses 397B in Winter Quarter (1-5 units) and 397C in Spring Quarter (1-5 units).

5. Students are encouraged to take an advanced course in literary theory or criticism.

6. A minimum of 25 additional units of graduate courses and seminars (excluding 396, 397, 398, and 399) distributed according to the adviser's judgment and the candidate's needs. A student may receive graduate credit for three 100-level courses in the Department of English.

7. Consent of the adviser if courses taken outside the Department of English are to count toward the 97-unit requirement.

8. An oral qualifying examination based on a reading guide, to be taken at the end of the summer after the first year of graduate work. The final decision as to qualification is made by the Graduate Studies Committee in consideration of the student's course record in conjunction with performance in the examination.

A student coming to the doctoral program who has done graduate work at another university must petition in the first year at Stanford for transfer credit for course work completed elsewhere. The petition should list the courses and grades and describe the nature and scope of course work, as well as the content, contact hours, and writing requirements. A syllabus must be included. The Director of Graduate Studies considers the petition in conjunction with the student's grades.

A student who has isolated a topic or area which seems promising for a doctoral thesis subject and who wants to explore it right away, and to incur additional specific course requirements insuring coverage and balance in program, may petition on entrance to qualify on the recommendation of a committee of advisers who would oversee and evaluate a full year's course of study. Such petitions are rigorously scrutinized by the Graduate Studies Committee and granted only in exceptional cases.

9. A University oral examination to be taken no later than the Winter Quarter of the student's third year of graduate work. This examination covers the field of concentration as defined by the student and the student's adviser.
teaching composition (397A) in Autumn Quarter, which includes the Apprenticeship Teaching Program, and the Teachers’ Workshop courses 397B in Winter Quarter (1-5 units) and 397C in Spring Quarter (1-5 units).

5. Students are encouraged to take an advanced course in literary theory or criticism.

6. Consent of the adviser if courses taken outside the Department of English are to count toward the requirement of 97 units.

7. Qualification: see item 8 under requirements of the Ph.D. program in English literature.

8. A University oral examination to be taken no later than the Winter Quarter of the student’s third year of graduate work. This examination covers the field of concentration as defined by the student and the student’s adviser.

ENGLISH AND COMPARATIVE LITERATURE

The Ph.D. program in English and Comparative Literature is designed for students wishing an extensive knowledge of the literature, thought, and history of England and of at least one foreign country, for one period. Approximately half of the student’s course work and reading is devoted to this period, with the remainder of the time given to other periods of English and American literature since 1350.

This degree, administered by the Department of English, is to be distinguished from the Ph.D. in Comparative Literature. The latter program is intended for students unusually well prepared in foreign languages and involves advanced work in three literatures, one of which may be English. Interested students should consult a Department of English adviser, but faculty from Comparative Literature may also provide useful supplementary information.

The requirements are as follows:

1. Qualifications: see item 8 under requirements of the Ph.D. program in English literature. For qualifications in the doctoral program in English and Comparative Literature, candidates are not held responsible for literature before 1350.

2. A knowledge of the basic structure of the English language and of Chaucer. This requirement may be met by examination, or by taking 10 units of courses chosen from among those offered in linguistics, English philology, and early and middle English literature including Chaucer. No particular courses are required of all students.

3. Students who began their Ph.D. course in September 1992, or thereafter, are required to take a 5-unit course, Introduction to Graduate Study, and a 2-unit laboratory in pedagogy.

Students who entered the Ph.D. program prior to September 1992 are required to have taken in the Autumn Quarter of their first year a 2-unit course introducing the new graduate student to the various opportunities and responsibilities of the department.

4. In their second year, students who began their Ph.D. course in September 1992, or thereafter, are required to complete in Autumn Quarter, a Teachers’ Workshop, which includes the Apprentice Teaching Program described above, and a Teachers’ Workshop in Winter Quarter. There are no units associated with this work.

Students who entered the Ph.D. program prior to September 1992 are required to have taken in their second year a 5-unit course on teaching composition (397A) in the Autumn Quarter, which includes the Apprentice Teaching Program, and the Teachers’ Workshop courses 397B in Winter Quarter (1-5 units) and 397C in Spring Quarter (1-5 units).

5. A knowledge of one foreign language comparable to that demanded under the basic program and an advanced reading knowledge of a second language.

6. A minimum of 45 units in the history, thought, and literature of one period, in two or more languages, one of which must be English and one foreign. Students normally include at least two courses in a foreign literature read in the original language and two courses listed under Comparative Literature or Modern Thought and Literature. As many as 20 units of this requirement may be satisfied through courses in reading and research. A student may receive graduate credit for three 100-level courses in the Department of English.

7. A minimum of six courses for a letter grade from graduate colloquia and graduate seminars, of which three must be graduate seminars and of which at least four must be in the Department of English. Among these courses, students should take one in literary theory or criticism. These colloquia and seminars should be in different genres and periods as approved by the adviser.

8. A University oral examination covering the field of concentration (as defined by the student and the student’s adviser). This examination, based on a reading list established by the candidate in consultation with his or her adviser, is normally taken no later than the Winter Quarter of the third year of graduate study. However, those who spend the third year studying abroad may take this examination after their return early in the fourth year.

LANGUAGE REQUIREMENTS

All candidates for the Ph.D. degree (except those in English and Comparative Literature, for whom special language requirements prevail) must demonstrate a reading knowledge of two foreign languages. Candidates in the earlier periods must offer Latin and one of the following
languages: Greek, French, German, Italian, or Spanish. In some instances, they may be required to offer a third language. Candidates in the later period (that is, after the Renaissance) must offer either Latin, French, or German as one language and may choose the second language from the following: Greek, Latin, French, German, Italian, Spanish, Russian, or another language relevant to the student's field of study. In all cases, the choice of languages offered must have the approval of the candidate's adviser. Any substitution of another language must be approved by the Director of Graduate Studies.

The Graduate Studies Committee does not accept courses taken as an undergraduate in satisfaction of the language requirement for doctoral candidates. For students coming to doctoral work at Stanford from graduate work done elsewhere, satisfaction of a foreign language requirement is determined by the Director of Graduate Studies based on the contact hours, syllabus, reading list, etc. Transfer is not automatic.

The candidate must satisfy one language requirement by the end of the first year (that is, before registration in the following year), and the other by the end of the third year.

Foreign language requirements for the Ph.D. may be fulfilled in any of the following ways:
1. A reading examination given each quarter by the various language departments, except for Latin and Greek.
2. For Latin and Greek, an examination by the Department of English. The Latin examination is given before registration in the Autumn Quarter in order to permit those who need the course to register for Latin 3. It is also given in the eighth week of the Winter and Spring Quarters, along with other department examinations for languages not tested by the Educational Testing Service.
3. Passage with a grade of 'B' or higher of a course in literature numbered 100 or higher in a foreign language department at Stanford. As an alternative for Latin, French, and Spanish, passage of Latin 51 and 52, French 50, Italian 50, and Spanish 50, respectively, with a grade of 'B' or higher.

CANDIDACY

Students are expected to file for candidacy after successful completion of qualifying procedures and, in any event, by the end of the second year of doctoral study. Candidacy is valid for five years, and may be extended, subject to satisfactory progress.

DISSERTATION

As early as possible during their graduate study, Ph.D. candidates are expected to find a topic requiring extensive original research and to seek out a member of the department as his or her adviser. The adviser works with the student to select a committee to supervise the dissertation. Candidates should take this crucial step as early in their graduate careers as possible. The committee may well advise extra preparation within or outside the department, and time should be allowed for such work.

Immediately after the dissertation topic has been approved by the adviser, the candidate should file a formal reading committee form as prescribed by the University.

The dissertation must be submitted to the adviser in rough draft but in substantially final form at least four weeks before the University deadline in the quarter during which the candidate expects to receive the Ph.D. degree. Dissertations may not be submitted during the Summer Quarter.

JOINT Ph.D. IN ENGLISH AND HUMANITIES

The Department of English participates in the Graduate Program in Humanities leading to the joint Ph.D. degree in English and Humanities. For a description of that program, see the "Humanities Special Programs" section of this bulletin.

Ph.D. IN MODERN THOUGHT AND LITERATURE

Stanford also offers a Ph.D. degree in Modern Thought and Literature. Under this program, students devote approximately half of their time to a modern literature from the Enlightenment to the present, and the other half in interdisciplinary studies. Interested students should see the "Modern Thought and Literature" section of this bulletin and consult the chair of the program.

CREATIVE WRITING FELLOWSHIPS

The Creative Writing Program each year offers five two-year fellowships in poetry and five two-year fellowships in fiction. These are not degree-granting fellowships. Information is available in the Creative Writing office (650) 723-2637.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

NUMBERING SYSTEM

Writing and Critical Thinking Courses: 1-3
Introduction to Literature: 5
Introduction to the Humanities: 7, 8, 9
English Language Courses: 101-109, 200-209
English Period Courses: 10-19, 110-119, 210-219, 310-319
American Period Courses: 20-29, 120-129, 220-229, 320-329
Genre Courses:
Drama: 40-45, 140-145, 240-249, 340-349
Poetry: 50-59, 150-159, 250-259, 350-359
Topic Courses: 60-69, 160-169, 260-269, 360-369
Author Courses: 70-79, 170-179, 270-289, 370-389
Seminars for English Majors: 180-189
Graduate Colloquia: 300-309
Writing Courses, Workshops, Individual Study, etc.: 90-99, 190-199, 290-299, 390-399

INTRODUCTORY
Classes designed for students whose major is undeclared or is not in English.

1A, 1B, Writing and Critical Thinking—The successful completion in proper sequence of 1 and 2 satisfies the first-year Writing Requirement (W). Both involve reading texts and reviewing writing techniques. First quarter: students concentrate on finding an appropriate thesis and developing and organizing ideas. Second quarter: students concentrate on style and diction and on preparing and writing researched essays. Students choose from one of three general categories (A, B, or C). Readings vary in each, but the primary concern is student writing and its improvement. All are expository writing courses, not conventional courses in cultural studies, literature, etc. (W)

1A, 2A. Writing and the Arts of Persuasion—Writing generally based on readings of effective arguments.
3 units, Aut-Win, Win-Spr (Staff)

1B, 2B. Writing about Social and Political Issues—Writing generally based on readings drawn from social science discipline.
3 units, Aut-Win, Win-Spr (Staff)

1C, 2C. Writing about Literature, Film and Media—Writing generally about literature and other creative forms.
3 units, Aut-Win, Win-Spr (Staff)

3. Intensified Writing and Critical Thinking—Fulfills the first-year Writing Requirement (W) in one quarter, offered only to students scoring 4 or 5 on the English AP exam. Classes meet twice a week for 75 minutes along with individual tutorial sessions with the instructor. Students concentrate on the same writing techniques as those presented in the 1 and 2 sequence, choosing from one of three general thematic categories (A, B, or C). Readings vary in each, but the primary concern is student writing and its improvement. All are expository writing courses, not conventional courses in cultural studies, literature, film, etc. (W)

3A. Writing and the Arts of Persuasion—Writing generally based on readings of effective arguments.
4 units, Aut, Win, Spr (Staff)

3B. Writing about Social and Political Issues—Writing generally based on readings drawn from social science discipline.
4 units, Aut, Win, Spr (Staff)

3C. Writing about Literature, Film and Media—Writing generally about literature and other creative forms.
4 units, Aut, Win, Spr (Staff)

4. Directed Writing—For students who have completed the Writing Requirement and wish further work in writing. Workshops and individual tutorials, tailored to each student’s needs. Graduate credit available.

3 units, not given 1997-98

5. Introduction to Literature—Enriches understanding and appreciation of literature by introducing the essential tools and concepts used in textual analysis. Readings include masterpieces from a wide variety of literary genres, historical periods, and national literatures. GER:3a (DR:7)
3 units, Spr (Evans)

7, 8, 9. Literature and the Arts—Area One Program sequence paired with special sections of Writing and Critical Thinking, emphasizing literature, writing, and the creative imagination. Lectures explore literature in its cultural context with sessions on art, architecture, music, and drama, moving chronologically from antiquity to the present, setting works in historical, intellectual, and generic perspective. Students generally meet three times a week for lectures, and three times weekly to discuss texts and work on writing. Instructors are experienced writing teachers, and student essays receive close attention. Writing seminars use a careful reading of the texts to help students understand the process of writing and to improve their own writing. Students must complete all 15 units of the 7, 8, and 9 sequence to fulfill the requirement. Each student must enroll concurrently in the writing section, if any, paired with their Area 1 assignment for the quarter. Students who scored 4 or 5 on an English AP exam may fulfill the first-year Writing Requirement with a 4-unit Writing and Critical Thinking sequence. Others must complete a 6-unit sequence of writing sections. Depending on writing section assignment and AP status, students in the three-quarter 7, 8, and 9 sequence enroll in a total of 5 to 8 units of Literature and the Arts course work each quarter to fulfill the University’s Area 1 and the first-year Writing requirements.

7, 7A. Antiquity and the Middle Ages—From Gilgamesh and the Hebrew Bible to the dawn of the Renaissance; works by Homer, classical sculpture, Plato, Virgil, Roman architecture, Lao Tze, the New Testament, Sung landscape painting, Stendhla, W. African Art, Marie de France, the Popol Vuh, Giotto, and Chaucer. Writing instruction concentrates on critical thinking, organization, and technical pro-
ficiency. GER:1 (DR:1) (three-quarter sequence)
5-8 units, Aut (Steidle, Staff)
8,8A,8B,8C. Renaissance and Enlightenment—Readings from the Renaissance to the Enlightenment, including works by Machiavelli, painters of the Italian and the Northern Renaissance, Bach, Shakespeare, Donne, Milton, Defoe, Swift, Mozart, Voltaire, Mary Wollstonecraft, Paine, Franklin. Writing instruction concentrates on style and diction, and on preparing and writing a research paper. GER:1 (DR:1) (three-quarter sequence)
5-8 units, Win (Riggs, Staff)
9,9B,9C. The Modern World—Thought and literature from the French Revolution to contemporary times, including works by Mary Shelley, Hardy, Marx, Douglass, Freud, Woolf, and Morrison; art from European and African traditions; film and jazz. GER:1 (DR:1) (three-quarter sequence)
5-8 units, Spr (Marsh, Staff)
10,11,12. Masterpieces of English and American Literature—In-depth study of selected works by major English and American writers from the medieval to modern periods.
10. Masterpieces of English Literature I: Chaucer, Shakespeare, Milton, and their Contemporaries—(English majors and others taking 5 units, register for 110.) Introduces medieval and Renaissance literature through the works of Chaucer, Shakespeare, Milton, and selected contemporaries. GER:3a (DR:7)
3 units, Aut (Summit)
11. Masterpieces of English Literature II: From the Enlightenment to the Modern Period—(English majors and others taking 5 units, register for 111.) Introduction to literary masterpieces written in English between 1700 and 1950. Treats fiction and poetry, with some drama. GER:3a (DR:7)
3 units, Win (Harkin)
12. Masterpieces of American Literature—(English majors and others taking 5 units, register for 112.) Survey of some major works of American literature, 1840-1940. Authors: Hawthorne, Melville, Whitman, Dickinson, James, Fitzgerald, Wright, Larsen. GER:3a (DR:7)
3 units, Spr (Porter)
30. The Novel—(English majors and others taking 5 units, register for 130.) Introduction to the novel through a close, sympathetic reading of a variety of major novels, focusing on their construction, narrative technique, and expression of human values. not given 1997-98
40. Introduction to Drama—(English majors and others taking 5 units, register for 140.) Principal dramatic forms, development of dramatic art, masterpieces of the theater from various periods, countries. GER:3a (DR:7)
3 units, Win (Boland)
Spr (Lindenberger)
50. Poetry and Poetics—(English majors and others taking 5 units, register for 150.) Introduction to the reading of poetry through a variety of poems, emphasizing the ways the meanings of poems are shaped through diction, imagery, figurative language, and technical elements of verse. GER:3a (DR:7)
3 units, Win (Boland)
Spr (Lindenberger)
60. The English Bible—(English majors and others taking 5 units, register for 160.) Selected readings in important versions of the English Bible as the source, inspiration, and reference for English and American literary works. GER:3a (DR:7 or 8)
3 units, Spr (Brown)
65A. Introduction to Medieval Culture—(English majors and others taking 5 units, register for 165A.) Introduction to the development of medieval culture through study of religious, philosophical, literary, artistic, social, and political sources, emphasizing interrelationships among them. GER:3a (DR:7 or 8)
3 units, Spr (Brown, Miller)
65B. Arthurian Literature—(English majors and others taking 5 units, register for 165B.) Survey of medieval classics (in translation) that recount the legends of Arthur and his companions. Focuses on the relation between history and fiction, the social uses of literature, and on the construction of gender roles. GER:3a (DR:7)
3 units, Aut (Brown)
68A. Introduction to American Indian Studies—(English majors and others taking 5 units, register for 168A.) GER:3a (DR:7)
3 units, Aut (Warrior)
70N. Stanford Introductory Seminar: Modern Short Fiction—Close Reading of a Text—Preference to freshmen. GER:3a (DR:7)
3 units, Aut (L’Heureux)
71N. Stanford Introductory Seminar: Metamorphoses—Preference to freshmen. GER:3a (DR:7)
3 units, Win (Middlebrook)
72N. Stanford Introductory Seminar: Native Studies—Preference to freshmen. GER:3a (DR:7)
3 units, Win (Warrior)
73N. Stanford Introductory Seminar: Writers at Work—Preference to freshmen. GER:3a (DR:7)
3 units, Spr (Porter)
74N. Stanford Introductory Seminar: Chicano Culture—Preference to freshmen. GER:3a (DR:7)
3 units, Win (Romero)
80Q. Stanford Introductory Seminar: Kipling—Propagandist and Critic of Empire—Preference to sophomores. GER:3a (DR:7)
3 units, Spr (Kaul)

81Q. Stanford Introductory Seminar: Multimedia Metamorphoses—Preference to sophomores. GER:3a (DR:7)
3 units, Win (Middlebrook)

82Q. Stanford Introductory Seminar: Dickens and Hardy—Preference to sophomores. 3-5 units, Aut (Marsh)

83Q. Stanford Introductory Seminar: Satire—Preference to sophomores. GER:3a (DR:7)
3 units, Win (Carnochan)

84Q. Stanford Introductory Seminar: Native American Studies—Preference to sophomores. GER:3a (DR:7)
3 units, Win (Warrior)

85Q. Stanford Introductory Seminar: Shakespeare’s Plays—Preference to sophomores. (Area:D) GER:3a (DR:7)
5 units, Aut (Rebholz)

90. Fiction Writing—Basic problems of narrative and imaginative writing. Prerequisite: completion of the writing requirement.
5 units, Aut, Win, Spr (Chang, Isle MacDonald, Scribner, Snowman, Vann)

92. Reading and Writing Poetry—Introduction to the understanding and writing of poetry. Prerequisite: completion of the writing requirement. (Area:P)
5 units, Aut, Win, Spr (Richter, Wiman)

BASIC UNDERGRADUATE SURVEYS, SEMINARS, AND WORKSHOPS

Note—Graduate students may receive graduate credit for three 100-level courses.

102. History of the English Language—(Same as Linguistics 62.) Evolution of English in Britain and the U.S.; colonial and post-colonial English; the use of English world-wide. Emphasis is on issues in language contact, standardization, and the development of English as a literary medium. GER:3a (DR:7)
5 units, Aut (Traugott)

110. Masterpieces of English Literature I: Chaucer, Shakespeare, Milton, and their Contemporaries—See 10. GER:3a (DR:7)
5 units, Aut (Summit)

111. Masterpieces of English Literature II: From the Enlightenment to the Modern Period—See 11. GER:3a (DR:7)
5 units, Win (Harkin)

112. Masterpieces of American Literature—See 12. GER:3a (DR:7)
5 units, Spr (Porter)

113. The Renaissance—A basic survey of English literature. (Area:C) GER:3a (DR:7)
5 units, Aut (Orgel)

5 units, Spr (Bourbon)

119B. American and British Romanticism—(Areas:F,G) GER:3a (DR:7)
5 units, Win (Halliburton)

119C. Survey of Victorian Literature—(Area:F)
5 units, Spr (Olsen)

121. American Literature and Culture to 1855—(Same as American Studies 150.) (Area:G)
5 units, Win (Luria)

124C. Introduction to Chicano History and Culture—(Same as History 162.) The history, culture, and literature of the nation’s second largest ethnic minority, Mexican Americans. Chronological focus on the 19th and 20th centuries. Themes: immigration, identity, urban adaptation, the experiences of Chicanas, racial segregation, cultural production, and other key topics central to understanding the Mexican American experience. (Area:H) GER:3a,4b (DR:3,7)
5 units, Aut (Camarillo, Moya)

130. The Novel—See 30.
not given 1997-98

131. The 18th-Century British Novel—(Area:E)
GER:3a (DR:7)
5 units, Aut (Connor)

132. The 19th-Century English Novel—(Area:F)
GER:3a (DR:7)
5 units, Aut (Marsh)

5 units, Win (L’Heureux)

140. Introduction to Drama—See 40.
not given 1997-98

141. Renaissance Drama—Surveys the great plays of English Renaissance; works from Kyd, Marlowe, Jonson, Webster. Selected works from French theater (Molière, Racine) for comparative purposes. (Area:C) GER:3a (DR:7)
not given 1997-98
150. Poetry and Poetics—See 50. (Area:P) GER:3a (DR:7) (WIM)
5 units, Win (Boland)
Spr (Linderberger)

154A,B. British Romanticism and Literary Modernity, Parts 1 and 2—Two-quarter sequence examining how Romanticism paves the way for literary “modernity” and Modernism itself; students enrolling in Part 2 are advised to have taken Part 1. Emphasis is on Romantic writers (poets especially); some engagement with Modernist and post-Modernist texts in conversation with Romanticism. Topics: formal and thematic experimentation in relation to experience of “the modern;” the imagination (its processes and products) as a fundamental source of human value; the French Revolution as catalyst for Romanticism’s literary revolutions; Romanticism’s shaping influences on 19th and 20th Century literature, art, and critical theory. Part 1 focuses on “first-generation” British Romanticists (Blake, Wollstonecraft, Godwin, Wordsworth, Coleridge, and Austen); second quarter includes Percy and Mary Shelley, Byron, Peacock, and Keats; each quarter features brief “conversation” readings in modern writers like Woolf, Beckett, Eliot, Loy, H. D., Stevens, Duncan, Ginsberg, Ashbery, Guest, Palmer, Cole, Moriarty, Howe, Brathwaite, Oppen, etc. (Area:F) GER:3a (DR:7)
5 units, Win (Kaufman)

157. 20th-Century Poetry and Philosophy—Wittgenstein; experimental prose and poetry, ordinary language and the poetics of philosophy. (Area:H) GER:3a (DR:7)
5 units, Win (Bourbon)

158. French and American Symbolist Poetry—
(Area:H)
5 units, Win (Fields)

160. The English Bible—(See 60.) GER:3a (DR:7)
5 units, Spr (Brown)

160G. Film Noir, with Literary and Cultural Backgrounds—(Area:H)
5 units, Spr (Fields)

161A. Afro-American Writing, 1950-1970—Identifies central literary and intellectual concerns among Afro-American writers, emphasizing the historical and social context. The emergence of the Civil Rights movement of the 1960s, the Black Power/Black Arts movement of the 1960s, and the emergence of a large number of women writers in the second part of the period. Continuities and changes in the work of individual writers over time. The relation between literary style and the artist’s conception of audience and relation to community. Readings, entire and excerpted, from novels, essays, poetry. Authors: James Baldwin, Amiri Baraka, Gwendolyn Brooks, Ralph Ellison, Lorraine Hansberry, Leroi Jones, Martin Luther King, Jr., Malcolm X. (Area:H) GER:3a (DR:7)
5 units, Spr (Drake)

161B. British Romanticism and Literary Modernity—Relationship between narration and detection and their association with marginality, studying the function of detection in the works of “marginal” and “central” writers. (Area:H) GER:3a (DR:7)
5 units, Spr (Drake)

162G. Writing by 20th-Century Women of Color—(Area:H) GER:3a (DR:7)
5 units, Win (Moya)

163C. Chicana Writers—(Area:H) GER:3a (DR:7)
5 units, Spr (Romero)

163G. Literary and Visual Culture in 18th-Century Britain—Introduces connections between literary and visual culture in 18th-century England. Texts by Addison, Pope, Burke, and others on aesthetics, looking at the works and writings of artists including Hogarth, Reynolds, and Gainsborough. Topics: the relation of different viewers to (natural and represented) landscapes, city-country oppositions, the sublime, and the social role of the visual arts in the period. (Area:E) GER:3a (DR:7)
5 units, Aut (Harkin)

164B. Imagining the Holocaust—How has the literary imagination envisioned the destruction of European Jewry? The Holocaust and European, Israeli, and American responses as seen through documentation, diaries, fiction, and poetry by Appelfeld, Borowski, Wiesel, Celan, Levi, Roth, Malamud, Schindler’s List (Keneally), and through visual art. Survivor addresses the class. GER 3a (DR:7)
5 units, Spr (Felstiner)

165A. Introduction to Medieval Culture—(Same as History 105A, Medieval Studies 165.) See 65A. (Area:B) GER:3a (DR:7 or 8)
5 units, Spr (Brown, Miller)

165B. Arthurian Literature—See 65B. (Area:B) GER:3a (DR:7)
5 units, Aut (Brown)

166D. Introduction to Critical Theory: Literary Theory since Plato—(Same as 266D.) Introduction to the history of literary theory in the Western tradition. Emphasis is on the history of attempts to define, locate, or engage “the literary,” and of attempts to understand it in relation to philosophy, history, politics, sexuality, gender, race, psychology, language, etc. GER:3a (DR:7)
5 units, Aut (Kaufman)

168A. Introduction to American Indian Studies—(See 68A.) (Area:H) GER:3a (DR:7)
5 units, Aut (Warrior)

171. Chaucer—Chaucer’s Canterbury Tales and selected short poems in Middle English. Emphasis
is on Chaucer’s language and the cultural contexts of medieval England. (Area:B) GER:3a (DR:7) 5 units, Win (Summit)

172. Milton—(Area:C) GER:3a (DR:7) 5 units, Aut (Evans)

173B. Shakespeare—As You Like It, The Merchant of Venice, Henry IV: Part One, Henry IV: Part Two, Hamlet, Measure for Measure, King Lear, The Winter’s Tale. (Area:D) GER:3a (DR:7) 5 units, Win (Rebholz)

173C. Shakespeare—(Area:D) GER:3a (DR:7) 5 units, Spr (Parker)

173F. Shakespeare on Film—Shakespeare’s major works (Henry V, Hamlet, Othello, King Lear, and The Tempest). Emphasis is on the texts’ interpretation in performance and the original contexts of Shakespeare’s stage. Modern films and how directors (Welles, Olivier, Branagh, and Kurosawa) have interpreted these plays for 20th-century audiences. Requires viewing of an average of one film a week. (Area:D) GER:3a (DR:7) 5 units, Aut (Summit)

177B. Virginia Woolf and Bloomsbury—(Area:H) GER:3a (DR:7) 5 units, Aut (Halliburton)

180-189. Seminars for English Majors—Scholarly and critical studies of literary texts. One seminar (or its equivalent) is required of all English majors. 180-188 satisfy the appropriate area requirements, B-H, P (see program for major in English above). The subject matter of 180 is mainly linguistic studies; 181, Medieval literature; 182, Renaissance literature, etc.; 189, which can count as one of three required electives (see program for major in English above), addresses the theory of literary genres.

181E. Seminar: Versions of Troilus and Cressida—(Area:B) 5 units, Aut (Brown)

182. Seminar: Renaissance Lyric—(Area:C) 5 units, Spr (Evans)

182E. Seminar: The Production of Elizabethan Literature—(Area:C) 5 units, Aut (Riggs)

182H. Seminar: Brought to Bed—Renaissance Obstetrics and the Poetics of Childbirth—(Area:C) 5 units, Aut (Bicks)

185. Seminar: Dickens and Film—(Area:F) 5 units, Spr (Marsh)

186A. Seminar: Psychological Themes in American Fiction—Poe to Hawkes—(Area:G) 5 units, Aut (T. Moser)

187D. Seminar: Modern British and American Poetry—(Area:H) 5 units, Win (Felstiner)

187E. Seminar: 20th-Century British Theater—(Area:H) 5 units, Win (Bartholomew) 5 units, Spr (Bacon)

188. Seminar: Poetry and Poetics—(Area:P) 5 units, Aut (Di Piero) Spr (Felstiner)

190. Intermediate Fiction Writing—May be taken twice. Manuscript must be submitted to Creative Writing office between last day of preceding quarter and the Friday before the beginning of classes. Prerequisite: 90. 5 units, Aut, Win, Spr (Chang, Isle, Tallent, Vann, Wolff)

190C. Science Fiction Writing—Intermediate workshop in writing science fiction. Manuscript must be submitted in duplicate to Creative Writing office by end of preceding quarter. 5 units, Spr (Fowler, Murphy)

191. Expository Writing—Advanced composition open to undergraduates and graduates. Taught through tutorials, short lectures, and general discussion. General instruction in writing.

191E. Advanced General Composition 3 units, not given 1997-98

192. Intermediate Poetry Writing—May be taken twice. For admission, manuscript must be submitted Creative Writing office by last day of preceding quarter. Prerequisite: 92. 5 units, Aut, Spr (Wiman)

194. Individual Research—See section above on “Undergraduate Programs, Opportunities for Advanced Work, Individual Research.” 5 units, any quarter

195. Ad Hoc Undergraduate Seminars—Undergraduates (at least three) who wish in the following quarter to study a subject or an area not covered by regular courses, may plan an informal seminar and approach a member of the department to supervise it. A syllabus should be submitted to the Director of Undergraduate Advising at least two weeks before the end of the preceding quarter. No more than 5 units of credit are given for 195 and/or 198 in any one quarter. 195 may not be used to fulfill departmental area or elective requirements without permission. any quarter

196A. Honors Seminar: Critical Approaches to Literature—Required of all seniors in the English honors program. (See above, under “Honors Program.”) 5 units, Aut, sec. 1 (Solomon), sec. 2 (Dunn)
196B. Honors Essay Workshop—Required of all English honors students.
3 units, Win (Moser)

196T. Honors Tutorial
5 units, Aut, Win, Spr (Staff)

197. Senior Honors Essay
10 units in two quarters, Aut, Win, Spr (Staff)

198. Individual Work—Undergraduates who wish to study a subject or an area not covered by regular courses may, with permission, enroll for individual work under the supervision of a member of the department. No more than 5 units of credit are given for 198 and/or 195 in any one quarter. 198 may not be used to fulfill departmental area or elective requirements without permission. Group seminars are not considered appropriate to 198.

199. Senior Independent Study—Open, with department approval, to seniors majoring in English who wish to work throughout the year on a 10,000 word critical or scholarly essay (see notes above). Applicants submit a sample of their expository prose and a proposed topic for independent study with a bibliography to the Director of Undergraduate Studies, before preregistration in May of the junior year. Each student accepted is responsible for finding a department faculty director.
10-15 units in three quarters
Aut, Win, Spr (Staff)

TOPICS AND AUTHORS

Open to undergraduate and graduate students.

205. Old English—Study of Old English; critical reading of short poems and selected prose in language and literature.
alternate years, given 1998-99

211. Readings in Middle English—The language and dialects of Middle English and readings in the various genres of prose and poetry. (Area:B)
4-5 units, Win (Lerer)

212. The History of Rhetoric—(Same as Comparative Literature 212.) The history of the discipline of rhetoric from Classical Greek and Latin traditions, through medieval, Renaissance, modern, and contemporary treatments. Schemes and tropes (Cicero and Quintilian); grammatical education and the schools (Geoffrey Vinsauf, John of Garland); Renaissance handbooks (Wilson, Puttenham); 18th- and 19th-century oratory; current appropriations (e.g., Paul de Man, deconstruction). Texts are read for their deployments of rhetorical devices and their thematic attentions to verbal organization (e.g., selections from the Aeneid, medieval lyrics, Chaucer's Canterbury Tales, Shakespeare's Hamlet, Augustan and Romantic Poetry, 19th-century prose fiction). Modern English translations; some emphasis to original-language texts of earlier periods. (Area:P)
4-5 units, Win (Lerer)

215D. Sensibility, Gender, and the Novel, 1740-1820—Focuses on novels and other texts from 1740 to 1820 which explore notions of sentiment and sympathy as a basis for social and aesthetic practice. Class reads work of novelists from Samuel Richardson and Laurence Sterne to Jane Austen, texts by Hume, Smith, Wollstonecraft etc. Readings in relevant recent critical work on gender and the novel. (Area:E)
4-5 units, Win (Harkin)

220D. Native American Writers and the 19th Century—(Areas:G,H)
4-5 units, Aut (Warrior)

239. American Short Fiction—(Areas:G,H)
4-5 units, Aut (Fields)

242. Restoration and 18th-Century Drama—Plays by Behn, Dryden, Etherege, Congreve, Centlivre, Addison, Lillo, Gay, Goldsmith, Sheridan, and Inchbald. Focus is on relations between drama and cultural and socio-economic transitions, examining key categories (e.g., comedy of manners, heroic tragedy, sentimental comedy) used by literary historians to describe English drama in the late 17th and 18th centuries. (Area:E)
4-5 units, Spr (Kaul)

263. Psychoanalytic Perspectives on Art and Literature—(Enroll in Art 263.)
4 units, Aut (Spitz)

290. Generative Devices in Imaginative Writing—Designed on the lines of the OuLiPo (Ouvroir de Littérature Potentielle/Workshop for Potential Literature), the Paris-based writers' group whose premise is that formal constraints make for artistic liberation. Students work with such restrictive techniques as palindromes, lipograms, heterograms, algorithms, homomorphisms, "false" translations, combinatories, etc., and with devices of their own invention. Prerequisites: 90, 92, or any advanced writing course.
4-5 units, Aut (Sorrentino)

290A. Advanced Fiction Writing—Students selected by the instructor. Promising fiction writers who have completed 90 and 190 workshop critique their stories with a view toward bringing them to publishable quality. Manuscripts must be submitted to the Creative Writing office by the last day of the preceding quarter.
4-5 units, Spr (MacDonald)

291. Innovative American Fiction since 1945—Reading/discussion of nine or ten post-war innovators, from among Jack Kerouac, John Hawkes,
William Burroughs, Kathy Acker, Harry Mathews, Walter Abish, et al. (Area:H)
4-5 units, Aut (Sorrentino)

292. Advanced Poetry Writing—Students selected by the instructor. Promising student poets write poetry in an atmosphere of mutual aid. Manuscripts must be submitted to the Creative Writing office by December 15.
4-5 units, Win (Di Piero)

293. Seminar in Literary Translation—After examining versions of Baudelaire, Rilke, Neruda, Celan, Pagis, Shakespeare, Keats, Dickinson, Whitman, Yeats, Eliot, Frost, and Duncan, students pursue and present their own work in progress, discussing practical and theoretical questions.
4-5 units, Win (Felstiner)

295. Interactivity, Narrative, and Artificial Intelligence—(Same as Computer Science 320.) Theory of, and approaches to, interactive narrative systems, especially those that incorporate artificial intelligence techniques. Weekly meetings, invited lecturers, discussion readings, critical review of CD Rom titles, and other implemented systems. Students create prototypes of AI-based interactive story systems.
not given 1997-98

300E. Colloquium: Linguistics and Literary Theory
4-5 units, Spr (Traugott)

302C. Colloquium: The Invention of the Great Book in the Renaissance—Prerequisite for undergraduates: consent of the instructor.
4-5 units, Aut (Orgel)

302E. Colloquium: The Production of Elizabethan Literature
4-5 units, Aut (Riggs)

303. Colloquium: 18th-Century Media Culture—From the Battle of the Ancients and Moderns to the Rise of the Novel—The 18th-century expansion and commercialization of print produced a struggle around the proper functions of reading. The cultural negotiation around the uses of media: the battle of the ancients and moderns (Swift's Tale and Battle; Pope's Dunciad); the emergence of culturally elevating forms of journalism (the Spectator, Female Spectator, Rambler, Critical Review, and the Monthly Review); and the rise of the novel as print media entertainment and improving literary form (Behn, Haywood, Defoe, Richardson, Fielding, and Austen). Some historians and theorists (Chartier, DeCerteau, Habermas, McLuhan, etc.)
4-5 units, Spr (Warner)

4-5 units, Win (Kaufman)

305C. Colloquium: Literature and Institutions—(Same as Comparative Literature 305C.) Theoretical investigation with practical examples of authorship, readership, evaluation, and the production and dissemination of literary texts from various historical periods.
4-5 units, Win (Lindenberger)

306E. Colloquium: Sovereignty and Native American Literature
4-5 units, Win (Warrior)

307A. Colloquium: American Thought and Literature: Jefferson to the Jameses
4-5 units, Aut (Halliburton)

307C. Colloquium: Materials and Methods for the Study of Modern Literature—Research techniques and library resources for conducting a Benjaminian mode of cultural inquiry into post-Enlightenment British and American literature (1750-present). Reconstructing the original ideological environments of selected modern works, including semantic, socio-economic, and technological dimensions. Non-canonical and quasi-literary discourses are used to historicize texts.
4-5 units, Spr (McPherson)

308J. Colloquium: New World Borders
4-5 units, Win (Romero)

308K. Slavery and American Fiction: Representation and American Fiction—Authors: Melville, Stowe, Morrison, Williams, Twain, Douglass, etc.
4-5 units, Aut (Porter)

350A. Seminar: Prosodies and Politics in American Poetry
4-5 units, Win (Middlebrook)

357. Seminar: Visual Poetics—In the last few decades, and in the light of the new computer technologies, we have witnessed a new wave of visual poetics, a poetry where visual placement of words and letters, layout, and page design is integral to the semantics of the text. The new visual poetics in its tradition: the 17th-century shaped poems of George Herbert to Concrete and post-Concrete, artist's books, and various cybertext experiments. The "look" of a poem matters significantly in per-
fectly "normal" verse and is, in one sense, a prosody. Poets/artists: Mary Ellen Solt’s *Anthology of Concrete Poetry* (especially Eugene Gomringer and the Brazilian poets), Ian Hamilton Finlay, Tom Phillips, Johanna Drucker, Tom Raworth, Steve McCaffrey, Joan Retallack, Susan Howe.

363D. Seminar: Identity, Experience, and Knowledge in Feminist Theory

4-5 units, Win (Perloff)


4-5 units, Aut (Polhemus)

368A. The Anthropology of Speed—(Enroll in French and Italian 370E.)

5 units, Aut (Schnapp)

373C. Seminar: Shakespeare—The canon of Shakespeare in itself and against the backdrop of contemporary contexts, including history and ideology; gender identity and transvestite theater, domestic spying and Other World "discovery;" miscegenation and race; the body, social hierarchy, and dramatic structure.

4-5 units, Spr (Parker)

390. Graduate Fiction Workshop—Primarily for graduate students in the writing program. May be repeated for credit. Prerequisite: consent of instructor.

3 units, Aut (L’Heureux)

Spr (Wolff)

391. Advanced Work in Writing and Criticism

any quarter

392. Graduate Poetry Workshop—Primarily for graduate students enrolled in the writing program. May be repeated for credit. Prerequisite: consent of instructor.

3 units, Aut (Di Piero)

Spr (Wolff)

394. Independent Study—Preparation for qualifying examination and for the Ph.D. oral examination.

any quarter

395. Ad Hoc Graduate Seminars—Three or more graduate students who wish in the following quarter to study a subject or an area not covered by regular courses and seminars may plan an informal seminar and approach a suitable member of the department to supervise it.

any quarter

396. Introduction to Graduate Study (for Ph.D. Students)—Required of all incoming Ph.D. students, addressing such basic questions as "What is ‘literary’ study in the 1990s and why are we engaged in it?" What role does literary study play (or not play) in the intellectual and cultural life of our society and how is that role being reconceived today? Focus is theory, but is intended as an examination of modern "theorists" who are themselves regarded as major "writers," since the rapprochement between "theory" and "imaginative writing" is one of the hallmarks of the period. Seminar with individual students reporting on the reading and leading class discussion.

3 units, Aut (Perloff)

396L. Laboratory in Pedagogy—Required for first-year Ph.D. students in English, Modern Thought and Literature, and Comparative Literature (except for Comparative Literature students doing their teaching in a foreign language). Preparation for TA in undergraduate literature courses. Focus is on leading discussions and grading papers.

2 units, Aut (Cormack, Rebholz)

397A. Teachers Workshop I—Seminar and apprenticeship required of second-year graduate students in English, Modern Thought and Literature, and Comparative Literature teaching in the Writing and Critical Thinking Program. Each student is assigned as an apprentice to an experienced teacher and sits in on classes, conferences, and tutorials, with eventual responsibility for conducting a class, grading papers, holding conferences. Meetings discuss rhetoric, theories of composition, and the teaching of writing. Readings in rhetoric and pedagogy. Each student designs a two-quarter syllabus in preparation for teaching English 1 and 2.

1-5 units, Aut (Reichard, Rebholz)

397B. Teachers Workshop II—Seminar for second-year graduate students teaching the first quarter of composition in the Writing and Critical Thinking Program. Focus is on the students’ concurrent teaching and preparation for teaching the second quarter of the sequence.

7-5 units, Win (Reichard, Rebholz)

397C. Teaching Workshop III—See 397B.

7-5 units, Spr (Reichard, Rebholz)

398. Research Course—A special subject of investigation under supervision of some member of the department. Thesis work is not registered under this course.

any quarter

398R. Revision and Development of a Paper—Student revises and develops a paper under the supervision of a faculty member with a view to possible publication.

5 units, any quarter

399. Thesis

3 units, Win (Staff)
PROGRAM IN
ETHICS IN SOCIETY

Director: Debra Satz
Steering Committee: Christopher Bobonich (Philosophy), Michael Bratman (Philosophy), Arnold Eisen (Religious Studies), John Ferejohn (Political Science), Barbara Koenig (Center for Biomedical Ethics), Susan Okin (Political Science).

Affiliated Faculty: Kenneth Arrow (Economics, emeritus), Barton Bernstein (History), Rachel Cohon (Philosophy), Fred Dretske (Philosophy), Elizabeth Hansot (Political Science), David Kennedy (History), David K. Stevenson (Pediatrics), Mark Tunick (Political Science), Sylvia Yanagisako (Anthropology), Lee Yearley (Religious Studies)

The Program in Ethics in Society is designed to foster scholarship, teaching, and moral reflection on fundamental issues in personal and public life. The program is grounded in moral and political philosophy, but it extends its concerns across a broad range of traditional disciplinary domains. The program is guided by the idea that ethical thought has application to current social questions and conflicts, and it seeks to encourage moral reflection and practice in areas such as international relations, politics, science, medicine, law, and business.

Current, and planned initiatives of the program include:
1. Supporting and fostering ethics research.
2. Supporting innovative teaching which focuses on the ethical dimensions relevant to the different disciplines across the curriculum.
3. Establishing a yearly faculty-graduate seminar focusing on topics in ethics and public life.

The program also sponsors a public lecture series, including the Tanner Lectures in Human Values, the Wesson Lectures in Problems of Democracy, and the Ethics in Society lecture series on a current social issue.

Students interested in pursuing studies which bring moral and political theory to bear on issues in public life should consult the director.

UNDERGRADUATE PROGRAM

The honors program in Ethics in Society is open to majors in every field and may be taken in addition to a department major. Students should apply for entry at the end of Spring Quarter of the sophomore year or at the beginning of the Autumn Quarter of the junior year. Applicants should have a cumulative grade point average (GPA) of 'B+' or higher. They should also maintain this minimum average in the courses taken to satisfy the requirements.

Requirements*

1. Required courses:
   a) Philosophy 20, Introduction to Moral Theory, or Philosophy 170. This is normally taken in the sophomore year.
   b) Philosophy 30, Introduction to Political Philosophy (same as Public Policy 103A), or Philosophy 171. This is normally taken in the sophomore year. At least one of (a) and (b) must be taken at the upper level.
   c) Ethics in Society 77, The Ethics of Social Decisions (same as Philosophy 77). Ethics in Society honors students must enroll under Ethics in Society. This course is aimed primarily at the junior year and is taken upon admission to the honors program.

2. One 4- or 5-unit undergraduate course on a subject approved by the honors adviser, designed to encourage students to explore those issues in Ethics in Society that are of particular interest to them. Courses of relevance to the Program in Ethics in Society are offered by members of the Program Committee and by other departments. Students may also take a course with the honors thesis in mind. To promote a broad interdisciplinary approach, this elective should normally be outside the Department of Philosophy. Students are not restricted to choosing from the sample of such courses included below.


4. Ethics in Society 200A,B, Honors Thesis, on a subject approved by the honors adviser, 8-10 units, with work spread over two quarters.

*Units credited toward the Ethics in Society honors requirements may not be double counted for the Philosophy major or minor.

A typical student takes Philosophy 20 or 170 and 30 or 171 in the sophomore year. On admission to the honors program as a junior, he or she takes Ethics in Society 77, given Winter Quarter. Requirement 3 is also fulfilled in Winter Quarter, and requirement 2 (the optional subject) at any time during the junior year, or possibly Autumn Quarter of the senior year. The honors thesis is normally written during the Autumn and Winter Quarters of the senior year.

GRADUATE STUDIES

In addition to the Ethics in Society Lecture Series, the program’s main provision for graduate students is a seminar on a topic in applied ethics. Students present talks on normative themes of their own choosing, providing an opportunity for graduate students from different disciplines
to interact in the process of deliberating over ethical matters of common interest.

**COURSES**

**UNDERGRADUATE**

For course information not listed, refer to the relevant department listings elsewhere in this bulletin. See the *Time Schedule* each quarter for any changes in listings.

3 units, Spr (Cohon)

5 units, Aut (Gruen)

77. **The Ethics of Social Decisions**—(Same as Philosophy 77.) Application of moral reasoning to a particular social or political issue. Topic this year is environmental justice.  
4 units, Win (Gruen)

78. **Medical Ethics**—(Enroll in Philosophy 78.) Introduction to moral reasoning and its application to problems in medicine: the morality of killing, the distribution of medical resources, and the use of radical categories in medical science.  
4 units, Spr (Gruen)

100. **Computers, Ethics, and Social Responsibility**—(Enroll in Computer Science 201.)  
3 units, Win (Roberts)

110. **Ethics and Public Policy**—(Enroll in Science, Technology, and Society 110; Public Policy 103B.)  
5 units, Win (McGinn)

1-4 units, Aut, Win, Spr (Lusignan, Gupta)

150. **Economics and Public Policy**—(Enroll in Economics 150, Public Policy 104.)  
5 units, Win (Noll)

154. **Feminist Political Theory: Gender, Power, and Justice**—(Enroll in Political Science 154.)  
5 units, Win (Staff)

156. **Economics of Health and Medical Care**—(Enroll in Economics 156, Health Research and Policy 256, Medical Information Sciences 256.)  
5 units, Aut (McClellan)

164. **Introduction to Race and Ethnicity in the American Experience**—(Enroll in History 164, American Studies 164.)  
5 units, Spr (Fredrickson, Camarillo)

170. **Ethical Theories**—(Enroll in Philosophy 170.)  
4 units, Spr (Cohon)

171. **Political Philosophy**—(Enroll in Philosophy 171.)  
4 units, Spr (Gruen)

172/272. **Is Morality too Demanding**—(Enroll in Philosophy 172/272.)  
4 units, Win (Gruen)

175. **Feminist Practical Ethics**—(Enroll in Philosophy 175.)  
4 units, Aut (Gruen)

177. **Philosophical Issues Concerning Race and Racism**—(Enroll in Philosophy 177.)  
4 units, Win (Satz)

185. **The Distribution of Income and Wealth**—(Enroll in Economics 185.)  
5 units, not given 1997-98

190. **Ethics in Society Honors Seminar**—(Same as Philosophy 178.) Interdisciplinary. Students present issues of public and personal morality; topics chosen with the advice of the instructors. Student-prepared reading list is made available a week prior to the presentation. Group discussion follows.  
3 units, Spr (Okin)

200A,B. **Honors Thesis**—Limited to Ethics in Society honors students.  
8-10 units, any two quarters (Staff)

251A,B. **Undergraduate Colloquium: Poverty and Homelessness in America**—(Enroll in History 251A.)  
5 units (Camarillo) given 1998-99

268. **Seminar: Contemporary Theories of Justice**—(Enroll in Political Science 268.)  
5 units, Win (Okin)

277. **Theory of Action (Cooperation)**—(Enroll in Philosophy 277.)  
3 units (Bratman, Satz) not given 1997-98

286. **Character and the Good Life**—(Enroll in Religious Studies 286.)  
5 units (Yearley) not given 1997-98
Feminist Studies is an interdisciplinary undergraduate program investigating the significance of gender in all areas of human life. Feminist analysis is based on the assumption that gender is a crucial factor in the organization of our personal lives and our social institutions. It focuses on how gender differences and gender inequality are created and perpetuated. The courses offered by the program use feminist perspectives to expand and reevaluate the assumptions at work in traditional disciplines in the study of individuals, cultures, social institutions, policy, and other areas of scholarly inquiry.

The Program in Feminist Studies coordinates the courses offered on women, gender, sexuality, and feminism throughout the University and facilitates the undergraduate major and minor in Feminist Studies. In addition, it seeks to encourage feminist analysis and teaching at Stanford, both in courses instituted within the program and those housed within departments.

The committee awards the annual Michelle Z. Rosaldo and Francisco Lopes prizes for the best undergraduate essays on women, gender, or feminism. The prizes are awarded in two divisions: a thesis division for senior honors theses and masters' papers written by undergraduates in coterminal degree programs, and an essay division. The Michelle Rosaldo prizes are awarded for the best work in the social sciences and the Francisco Lopes prizes for the best work in the humanities. Submissions are due in the Feminist Studies office April 14 for essays and May 14 for theses. Essays and theses completed later in Spring Quarter may be submitted for consideration the following year.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The major in Feminist Studies may be taken as a single major, as one of multiple majors, or as a secondary major. If taken as one of multiple majors, none of the 60 units counted toward the major

Medical School: Anne Arvin, Helen Blau, Marita Grudzen, Roy King, Cheryl Koopman, Herbert Liederman, Iris Litt, Charlea Massion, Philosophy: Debra Satz
Political Science: Elisabeth Hansot, Terry Karl, Susan Okin
Psychology: Laura Carstensen, Hazel Markus, Felicia Pratto
Religious Studies: Alice Bach, Rudy Busto, Hester Gelber
Slavic Languages: Monika Greenleaf
Sociology: Janet Johnston, Cecilia Ridgeway, Szonja Szelenyi
Spanish and Portuguese: Claire Fox, Mary L. Pratt, Yvonne Yarbro-Bejarano
in Feminist Studies may overlap with units counted toward the major in another department or program. But if taken as a secondary major, then up to 30 of the units counted toward the Feminist Studies major may also be counted toward fulfilling the major requirements in another department or program if that department or program consents. A maximum of 10 of the 60 units for the major may be taken on a pass/no credit basis; a maximum of 10 may be taken as independent study or directed reading.

Students interested in Feminist Studies should consult with the chair or program coordinator during sophomore year. The major should normally be declared by the beginning of a student’s third year, and must be declared by the senior year. Curriculum guidelines are available at the Feminist Studies office in Serra House, telephone (650) 723-2412 or visit the web site at www-stanford.edu/dept/femstudies. Majors should choose two faculty advisers, one of whom is usually the chair of the program, from the list of resource faculty (see above) and may consult with peer advisers. Faculty advisers work closely with the student in helping design an appropriate program of study. A proposal explaining the rationale for the plan of study and signed by both advisers must be submitted to the program office. The program office arranges a meeting between the student, chair, and the other adviser at the student’s request.

**CURRICULUM**

The following course of study is recommended for a major in Feminist Studies: a minimum of twelve courses (a core of five plus seven others) for a total of at least 60 units. The seven courses not in the core should be chosen in consultation with the student’s advisers. To ensure coverage, intellectual focus and breadth in the program, and practical experience, the twelve courses required for the major should be distributed among the core (five courses), the focus (at least five courses), and electives. A practicum is also taken, in addition to the twelve courses above.

**CORE**

The core consists of five courses. The first three are required and should be taken in sequence. The remaining two courses should be chosen from the list of feminist studies courses.

One of these courses should be in the social sciences, the other in the humanities. One of these two should offer a multicultural perspective.

**Required Courses**—Feminist Studies 101 (Introduction to Feminist Studies), 102 (a theory course), and 103 (a methodology course) must be taken in sequence.

Courses that fulfill the social science requirement in the Feminist Studies major can be found among courses listed under Anthropology, Education, History, Human Biology, Law, Political Science, Psychology, and Sociology.

**FOCUS**

Of the seven courses not part of the core, at least five should reflect a particular thematic focus, and all seven should be chosen in consultation with the student’s advisers.

1. At least three of the focus courses should be Feminist Studies courses or be selected from the list of affiliated courses in other departments and programs (see below).

2. At least one should be a major survey, methodology, or theory course, offered by a department or interdepartmental program as an initiation into the practice of study in the field.

The following thematic clusters illustrate foci that individual students can design, in consultation with their advisers:

- Cross-Cultural Perspectives on Gender
- Feminist Perspectives on Science, Technologies, and Health
- Gender and Education
- Gender and Popular Culture
- Lesbian, Gay, Bisexual Studies
- Medieval Gender Studies
- Women in Language and Symbol
- Women and Modernity
- Women and Religion
- Women and Work

**PRACTICUM**

For Feminist Studies majors, the practicum, taken for 3 to 6 units, should involve field research, community service, or other supervised research. This requirement may be fulfilled by designing a public service internship or by undertaking supervised work in a department. The practicum should be completed by Winter Quarter of the student’s senior year. In Feminist Studies 104, a senior seminar, majors present oral reports on the relationship of the practicum to their academic work and must submit a paper to receive credit for the practicum.

**MINORS**

The minor in Feminist Studies (FS) consists of at least six courses, for a minimum of 30 and a maximum of 36 units. The first two “Core” courses must be taken in sequence; the remaining four “Focus” courses may be taken in any order. The core consists of FS 101 (Introduction to Feminist Studies) and either FS 102 (a theory course) or FS 103 (a methodology course). The four course thematic focus may be designed by the student or may follow one of the suggested clusters listed.
above. One course within the thematic focus should address cross-cultural issues. The minor in Feminist Studies should be declared by the Winter Quarter of a student’s junior year.

A student who wishes to minor in Feminist Studies should complete a minor draft proposal and discuss the minor with one faculty adviser, selected from the Feminist Studies Resource Faculty list. The student should submit a Departmental Minor Declaration Form via the Web through the Registrar’s Office Home Page. The program office can also direct the student to a peer adviser who is a major in Feminist Studies.

HONORS CERTIFICATION FEMINIST STUDIES MAJORS

Admission—The honors program offers an opportunity to do supplemental independent research on a thesis of superior academic quality. It is open to students with a grade point average (GPA) of ‘B+’ or better in course work in Feminist Studies. Normally, students apply for honors certification in the junior year, or, at the latest, Autumn Quarter of the senior year. To apply, students should design a project in consultation with both of their major advisers. A proposal signed by both advisers, describing the project and including the number of units to be awarded, must be submitted to the chair of the program for final approval. In order for an honors proposal to be considered during a particular quarter, it must be submitted to the Feminist Studies office by the fifth week of the quarter.

Requirements—Units for approved honors projects are taken in addition to those units already approved for the major.

In addition to completing all the units proposed, the student submits in the senior year two preliminary drafts and a final draft of a thesis based on substantial research. In order for honors to be granted, the student’s two advisers must read the thesis and collectively certify, by means of a signed letter to the Feminist Studies Committee, that the thesis is of superior academic quality and merits the award of honors.

MAJORS IN OTHER DEPARTMENTS

Honors Certification in Feminist Studies for majors in other departments or programs, as distinguished from honors for students pursuing a major in Feminist Studies, is intended to complement study in any major. Students in any field of study are encouraged to apply.

Admission—Honors certification is open to students majoring in any field who have completed Feminist Studies 101 and 102 with a GPA of ‘B+’ or better, or who have taken three Feminist Studies courses related to the topic of their proposed honors research. Normally, students apply for honors certification in the first quarter of the junior year and must apply no later than the third quarter of the junior year. To apply, students must first consult the Chair of the Program in Feminist Studies outlining the plan for course work, the rationale for the program, and an honors project. The chair acts as one of the student’s faculty advisers and helps the student select two other faculty advisers to supervise the student’s progress. The completed application, with the signatures of two faculty advisers and the chair of the program, is reviewed by a subcommittee of the Feminist Studies Committee for final approval.

Requirements—

1. Thirty units of course work in addition to the units granted for the honors project.
   a) 15 units of core courses: Feminist Studies 101, 102, and 103.
   b) Select the remaining 15 units, in consultation with advisers, from the list of courses approved by the Feminist Studies program.

None of the courses selected may simultaneously count toward the student’s major.

2. Submit in the senior year two preliminary drafts, and then a final draft, of a thesis based on substantial research. The thesis must be of acceptable quality on an aspect of Feminist Studies approved by the student’s faculty committee. For students graduating in June, the first draft is due by the end of January and the second by mid-March. The final draft must be submitted four weeks before the end of exam week. Students must receive up to 10 units of credit for preparation of the honors thesis, but these units do not count toward requirement ‘1.’

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

Courses listed under the Core and Interdepartmental Offerings contain a significant component of attention to gender difference, the situation of women in Western or non-Western cultures, or the role of sex-gender systems in social organization. Some courses are planned after this bulletin is printed. Updated listings are available at the Feminist Studies office and on the web site at www-stanford.edu/dept/femstudies.

CORE

101A. Introduction to Feminist Studies—(Same as History 173C.) How gender inequality is created and perpetuated, and when feminist theory and movements emerge to respond to gender inequality. Topics: theories of inequality; history of feminism; international and multi-cultural perspectives on feminism; women’s work, health, and sexuality; creativity, spirituality, and movements for social change. GER:3b,4c (DR:9†)
5-6 units, Aut (Freedman)
102D. Feminist Literary Theories—(Same as Religious Studies 131.) Prerequisite: 101.
4 units, Aut (Bach)

103B/203B. Subjectivity in Feminist Research—Development of each student's personal voice in feminist research and writing. Emphasis is on the diversity of women's experiences. Fosters skills in personal essay writing. Prerequisites: 101, consent of instructor.
5 units, Spr (Krieger)

104. Practicum/Senior Seminar—For Feminist Studies majors only. Two-quarter, biweekly senior seminar. Students present oral reports on the relationship of the practicum to their academic work, submit a written analysis of the practicum, and discuss applications of feminist scholarship.
3-6 units, Aut, Win (Townsend)

105,106. Honors Work

108. Internship in Feminist Studies—For non-majors. Augments relevant course work in Feminist Studies with a supervised field, community, or lab experience, e.g., law offices, medical research and labs, social service agencies, legislative and other public offices, and local and national women's organizations. Credit represents approximately three hours work per unit each week. Required: a 3-5 page statement on the nature of the internship and its relevance to Feminist Studies. Must be arranged in advance through the program office (see application form on our web page). Prerequisites: at least one course in Feminist Studies, written consent of faculty sponsor.
1-6 units, any quarter

195. Directed Reading

INTERDEPARTMENTAL OFFERINGS

114. Greek Love and Queer Theory—(Same as Philosophy 106.)
4 units, Spr (Kaplan)

120. Women in the Modern Middle East—(Enroll in History 187C.)
5 units, Spr (Beinin, Reynolds)

125. Chicano/Chicana Religious Traditions—(Enroll in Religious Studies 143.)
4 units, Spr (Busto)

129. The Economics of Gender in Education and Employment—(Enroll in Education 361.)
3 units (Strober) not given 1997-98

130. Gender and Education—(Enroll in Education 170.)
4 units, Spr (Christopher)

134. Sociology of Gender—(Enroll in Sociology 142.)
3-5 units, Win (Ridgeway)

136. Utopian Political Thought—(Enroll in Political Science 153.)
5 units, Aut (Hansot)

137. Female Saints—(Enroll in French and Italian 208E.)
4 units, Aut (Cazelles)

139A. Education and the Status of Women: Comparative Perspective—(Enroll in Sociology 134, Education 197.)
4-5 units, Win (Ramirez)

140H. The Public Sphere and Women's Activism in Religious Movements: Christianity, Islam, and Hinduism—Provides an understanding of women's involvement in controversial religious movements through insights from feminist studies, anthropology, and cultural studies. Through a study of three different social movements, questions are raised about the role of public religiosity and gender relations in contemporary modern societies.
5 units, Spr (Mahmood)

140I. Women and Welfare—Explorations of the 1834 English Poor Law Amendment and contemporary U.S. welfare policy debates. Focus is on women's voices in welfare debates. Women's positions on welfare and how the position of women in welfare struggles illuminates various theories of the relationship between the State and the Body. The new dynamics of the organized Welfare Rights Movement, neo-conservative assaults on feminism and welfare, and the retreat of liberals from the traditional welfare-rights position.
5 units, Spr (Kuduk)

140J. Seminar on Lesbian and Gay Perspectives in Psychology—Historical review of theories of sexuality, including the "invention" of sexuality in the West, and the diagnosis and control of same sex desire in psychoanalysis and American psychiatry. Heterosexuality in social psychology's and sexology's theories of sexual attraction and behavior. Contemporary "lesbian and gay psychology" and its relationships with feminist, cultural, and social-constructivist psychology. Interactions between psychological accounts of sexuality, social identities, and lived experiences. Enrollment limited.
5 units, Win (Hegarty)

145A. Women's Health Research
1 unit, Aut, Win, Spr (Carstensen)

150. Virgin Mary and Images of Power—(Enroll in Religious Studies 234.)
5 units, Spr (Gelber)

150A. The Hebrew Bible: Issues of Power—(Enroll in Religious Studies 15.)
5 units, Win (Bach)

157. The Bible in Fiction, Fiction in the Bible—(Enroll in Religious Studies 134.)
5 units, Aut (Bach)
160A. Dance History and Philosophy—(Enroll in Dance 160A.)
  3-4 units, Win (Ross)

160B. Dance and Live Art in the 20th Century—
(Enroll in Dance 160B.)
  5 units, Spr (Ross)

(Enroll in English 161A.)
  5 units, Win (Drake)

161B. Dance and Live Art in the 20th Century—
(Enroll in Dance 160B.)
  5 units, Spr (Ross)

162G. Writing by 20th-century Women of Col-
(Enroll in English 162G.)
  5 units, Win (Moya)

(Enroll in English 161A.)
  5 units, Win (Drake)

165C. Sensibility, Gender, and the Novel, 1740-
1820—(Enroll in English 215D.)
  4-5 units, Win (Harkin)

169A. Queer Raza—(Enroll in Spanish and Portugu-
  ese 389.)
  5 units, Aut (Yarbro-Bejarano)

174A. Sex, Body, and Gender in Medieval Reli-
gions—(Enroll in Religious Studies 172.)
  4 units, Spr (Gelber)

182A. History of Education in the United States—
(Enroll in Education 201.)
  3 units, Aut (Tyack)

191B. Writing AIDS/Writing on AIDS—(Enroll in English/Writer and Critical Thinking 1, section 2; enrollment open only to students fulfilling the Freshman Writing Requirement.)
  3 units, Win (Townsend)

240/340. Lesbian Communities and Identities—
(Same as Anthropology 138.) Scholarship and re-
search on lesbian experience. Issues of homophobia, les-
bian intimacy and sexuality, femme and butch roles, les-
bian separatism, and the diversity of lesbian communities and identities. Prerequisite: consent of instructor.
  5 units, Spr (Krieger)

265A. Undergraduate Colloquium: The History of Sexuality in the United States—(Enroll in History 265A.)
  5 units, Spr (Freedman)

267. Gender, Development, and Women's Rights in International Perspective—(Enroll in Political Science 267.)
  5 units, Spr (Okin)

AFFILIATED
DEPARTMENTAL LISTINGS

These courses also count toward the Feminist Studies major.

ASIAN LANGUAGES

71N. Stanford Introductory Seminar: Lan-
guage and Gender in Japan—Myths and Re-
ality
  3 units, Win (Matsumoto)

CLASSICS

117. Gender, Violence, and Philosophy in An-
cient Religion
  3-4 units, Aut (Stephens, Gleason)

DRAMA

156H. Plays of Lillian Hellman
  4 units, Spr (Booker)

355R. Radical Latina Scholarship
  4 units, Spr (Moraga)

EDUCATION

276. Women and Moral Theory: Feminist Ap-
proaches to Ethics and Education
  4 units, Win (Noddings, Verducci)

ENGLISH

182H. Seminar: Brought to Bed—Renaissance
Obstetrics and the Politics of Childbirth
  5 units, Aut (Bicks)

FRENCH AND ITALIAN

224E. Psychoanalytic Theory of Femininity
  3-5 units, Aut (Hullot-Kentor)

HISTORY

36S. Sources and Methods Seminar: Posing,
Passing, and Pretending in Early Modern Eu-
rope
  5 units, Win (Weiss)

37S. Sources and Methods Seminar: Whores,
Nymphs, and Charming 'Tough' Guys—Images
of Male and Female Identity in Interwar Europe
  5 units, Win (Bruns)

47S. Sources and Methods Seminar: Gender and
History in Colonial Africa
  5 units, Aut (Schler)

50S. Sources and Methods Seminar: Race and
Popular Culture (in Black and White)
  5 units, Win (Thompson)

73S. Sources and Methods Seminar: When Wom-
en Arrived—Gender, Race, and Citizenship in
the United States
  5 units, Win (Mabie)

86S. Sources and Methods Seminar: Jewish
Women in the 20th Century
  5 units, Win (Spiegel)

162. Introduction to Chicano/a History and Cul-
ture
  5 units, Aut (Camarillo, Moya)
FOOD RESEARCH INSTITUTE

COMMUNICATION

The following courses are open to all students:

101/201. Film Aesthetics
4 units, Spr (Breitrose)

114. Introduction to the Moving Image
5 units, Aut (Krawitz)
Spr (Samuelson)

122A/222A. Documentary Film
4 units, Aut (Breitrose)

141B/241B. History of Film: The Second 50 Years
4 units, Win (Breitrose)

ENGLISH

160G. Film Noir, with Literary and Cultural Backgrounds
5 units, Spr (Fields)

173F. Shakespeare on Film
5 units, Aut (Summit)
Spr (Samuelson)

185. Seminar: Dickens and Film
5 units, Spr (Marsh)

FRENCH AND ITALIAN

192. Introduction to 20th-Century French Literature
3-5 units, Spr (Mudimbe-Boyoi)

192E. Images of Women in French Cinema: 1930-1990
3-5 units, Spr (Apostolidés)

GERMAN STUDIES

67A. Mass Culture, Cinema, and Nazi Germany
3 units, Win (Donahue-Bombosch)

162A. The Faust Legend in Literature and Film
3-4 units, Spr (Poor)

RELIGIOUS STUDIES

134. The Bible in Fiction; Fiction in the Bible
5 units, Aut (Bach)

179. Religion in Science Fiction and Fantasy
5 units, Win (Gelber)

SPANISH AND PORTUGUESE

363. Third Cinema and After
3-5 units, Spr (Fox)

FOOD RESEARCH INSTITUTE

Emeriti: (Professors) Bruce F. Johnston, Dudley Kirk, Clark W. Reynolds
Director: Jeffrey C. Williams
Associate Director: Carl H. Gotsch
Professors: Carl H. Gotsch, Timothy E. Josling, Scott R. Pearson, Anne E. Peck, Jeffrey C. Williams, Pan A. Yotopoulos
Assistant Professors: Heidi J. Albers, Frederic Zimmerman

The Food Research Institute, a research and teaching unit in the School of Humanities and Sciences, was founded 75 years ago to study problems of food supply, distribution, and consumption on a world-wide scale. The range of its investigation comprises the world food and agricultural economy, domestic and international trade in primary products, agriculture and economic development, and world population problems.

The Food Research Institute (FRI) will be closed in the near future and no new graduate students will be admitted. During 1997-98, faculty will offer courses to assist continuing FRI doctoral and master’s students complete their graduate programs. Some of the courses offered are open to undergraduate and graduate students from other departments, as indicated. Check the Time Schedule each quarter for course offerings.

COURSES

PRIMARILY FOR UNDERGRADUATES

103. The World Food Economy—(Same as Economics 106; graduate students register for 203.) Interrelationships among food, population, resources, and economic development. Agricultural and rural development in achieving economic and social progress in low-income nations. Emphasis on public sector decision-making as it relates to food policy.
5 units, Win (Falcon, Naylor)

118. Economic Development in Latin America—(Graduate students register for 218.) Contemporary approach to the political economy of development in historical perspective. Focuses on economic growth, structural change, and the distribution of income and wealth in open economies. The evolution from raw material and primary product based export economics to newly industrializing countries. The recent experience of macroeconomic stabilization, transformation of traditional agriculture, industrial restructuring, labor market adjustment, savings, and investment. The interdependence between economies at different levels of development (Mexico and the U.S., Central America and the Caribbean, the Andean and Southern Cone countries).
5 units, Win (Reynolds)

119. Development and Population Interactions in the Third World—(Graduate students register for 219.) The determinants and consequences of population growth and interactions with economic development. Historical and contemporary examination of the record of economic development and of population growth suggests a diversity of experience. Country case studies illustrate the systematic components of the experience of economic development and those of population growth, with implications in terms of alternative structures of development, the timing of the demographic transition, income distribution, employment, and migration.
5 units (Yotopoulos) given 1998-99

PRIMARILY FOR A.M. STUDENTS

203. World Food Economy—See 103.
218. Economic Development in Latin America—See 118.

PRIMARILY FOR Ph.D. STUDENTS

368A,B,C. Seminar on Doctoral Student Research—Presentations of dissertation research by doctoral student candidates.
3-5 units, Aut, Win, Spr (Williams, Albers, Zimmerman)

371,372,373,374. Directed Reading and Research
371. Aut (Staff)
372. Win (Staff)
373. Spr (Staff)
374. Sum (Staff)

401,402,403,404. Dissertation Reading and Research
401. Aut (Staff)
402. Win (Staff)
403. Spr (Staff)
404. Sum (Staff)

FRENCH AND ITALIAN

Emeriti: (Professors) Robert G. Cohn, John Freccero, Raymond D. Giraud, René Girard, Alphonse Juilland, Pauline Newman-Gordon, Roberto B. Sangiorgi, Leo Weinstein
Chair: Ralph M. Hester
Vice Chair: Robert Harrison

French Section
Professors: Jean-Marie Apostolidès (on leave Autumn), Marc Bertrand, Brigitte Cazelles (on leave Spring), Jean-Pierre Dupuy, Hans U. Gumbrecht (on leave Autumn), Ralph M. Hester, Valentine Y. Mudimbe (on leave Autumn), Michel Serres
Associate Professor: Elisabeth Mudimbe-Boyi
Assistant Professors: Odile Hullot-Kentor, Joshua Landy
Professor (Teaching): John G. Barson
Senior Lecturer: Nelee Langmuir
Lecturers: Jane Dozer-Rabedeau (Language Program Coordinator), Jérôme Courant (Spr), Mary Jane Parrine (Curator, Romance Languages and Humanities), Gérard Prieur (Spr), Isabelle Servant
Acting Instructor: Patrice Maniglier

Italian Section

Professors: Robert Harrison, Jeffrey Schnapp (Florence, Winter)
Associate Professor: Carolyn Springer
Courtesy Professor: Patricia Parker (English, Comparative Literature)
Senior Lecturers: Maria Devine, Annamaria Napolitano (Language Program Coordinator)
Lecturers: Marta Baldocchi, Emerlinda Campani (Spring), Giovanni Tempesta
Visiting Professor: Luigi Ballerini

FRENCH SECTION

The French Section offers a variety of programs in French language and linguistics, literature, cultural history, theory, Francophone, and interdisciplinary studies. Undergraduates may obtain the A.B. degree in French with emphasis on French Studies, French and African Studies, French and European Studies, French and Linguistics, or French and Engineering Studies. In addition to awarding the Ph.D. degree, the French Section also offers a Master of Arts. Doctoral candidates benefit from training which stresses excellence in scholarship, writing, and publication of scholarly articles and books, and teaching methodology.

With careful planning, A.B. candidates can pursue one of numerous possible extended majors or a double major with French as one component. Similarly, graduate students can take advantage of the joint Ph.D. option with Humanities, a minor in Comparative Literature or other fields, or, for doctoral candidates from outside the section, a minor in French. (See Graduate Program, Specialization below.)

The French Section also offers various on-campus activities to enhance its academic programs. The section hosts a wide-ranging lecture series featuring well-known national and international scholars throughout the year. La Maison Française, located at 610 Mayfield, is an undergraduate residence providing numerous opportunities for expanding the experience of French language and culture.

A curator for Romance Languages oversees the extensive collection in French at the Green library. The Hoover Institute on War, Revolution, and Peace also includes a wealth of information on 20th-century France.

A distinguished group of visiting faculty and instructors contribute extensively to the French Section. Stanford and the French Section also enjoy contacts with the Institut d'Etudes Politiques, the Ecole Polytechnique, and other prestigious institutions in France.

UNDERGRADUATE PROGRAMS

The undergraduate French Section offers a variety of programs in French culture, language, literature, and linguistics, including a major in French, French as double major, extended majors, and a minor in French. The goal is to encourage students to pursue a course of studies suited to their individual needs and interests.

Students considering any one of these options are required to have completed the first- and second-year language sequence (French 23), or its equivalent. Equivalent competency may be evaluated by a placement test administered by the department at the beginning of each quarter.

BACHELOR OF ARTS

Majors in French formulate their course curriculum in regular consultation with the French undergraduate major adviser. French majors must complete a minimum of 55 units of undergraduate work above the 100 level.

Requirements for the A.B. include one advanced language course (123, 125, or 261), three of the introductory series on French and Francophone literature and culture (130, 131, 132, 133), and a minimum of ten additional courses (40 units) numbered 140-299. Of these courses, at least four must be chosen from the prerevolution periods. Individual work (French 199) should normally be limited to 4 units.

With the approval of the adviser, a maximum of 24 upper-division units outside the French Section, including courses from the Stanford in Paris programs, may be credited toward the major.

MAJOR TRACKS

FRENCH AND AFRICAN STUDIES

Students wishing to major in French with an emphasis on African Studies may combine department offerings with courses listed under the African Studies program and courses in anthropology, history, linguistics, political science, or other appropriate departments. This track includes 12 units in advanced French language-related courses numbered above 100 and 16 units in four basic culture and literature courses. Three to four other department courses above French 133 must be taken for 12-16 units of culture, history, economics or politics. Six units in the same African language may be substituted for one of these courses. Additional courses outside the department, determined in consultation with the department adviser, must include three courses with a total of 15 units to be taken in related areas of history, international relations, political science, or other appropriate areas.

The following is one example of a concentration in this track.
Course No. and Subject | Units
--- | ---
French and African Studies: | |
120. France Today | 3
123. Creative Writing | 4
125. Contemporary French Usage, Spoken and Written | 4
130. Middle Ages and Renaissance France | 4
131. 17th- and 18th-Century France | 4
132. 19th- and 20th-Century France | 4
133. Contemporary Francophone Literature | 4
261. Stylistics and Textual Analysis | 4
Subtotal | 31

Other Courses:
170E. Introduction to African Systems of Thought | 4
278. Topics in French and Francophone Literature | 3-5
Lit., Cult., and Lang. 106A,B. Swahili | 8
Subtotal | 15-17

Additional Courses given in other Departments:
Pol. Sci. 118A. Political Change in Tropical Africa | 5
History 148C. Africa in the 20th Century | 5
History 248A. The End of Slavery in Africa and the Americas | 5
Subtotal | 15

Total units | 61-63

FRENCH AND FRANCOPHONE LITERATURE, LANGUAGE, AND CULTURE

The following is one example of a concentration in this track.

Advanced French Language and Basic Literature and Culture:
123 (125 or 261). Advanced Language | 4
130 (131, 132, 133). French and Francophone Literature and Culture | 12

Any Four Courses on Prerevolutionary Periods:
189Q. Romance: Texts and Movies | 4
224. 17th-Century Novel | 3-5
227. Elite and Popular Culture to 1789 | 3-5
295A. La Fontaine: Five Fables | 2
Subtotal | 28-32

Sample Selection of Additional Courses:
126. Technocratique | 3-5
190Q. Paris in History, Literature, and Film | 4
192. Introduction to 20th-century French Literature | 4
241. Symbolist Poetry | 4
251. Dieu Vivant | 3-5
262. Pronunciation and Phonetics | 3-5
278. Topics in French and Francophone Literature | 3-5
Subtotal | 24-32

Paris Program courses or courses in other departments (approved by department adviser) | 12-24
Total | 64

FRENCH AND ENGINEERING STUDIES

Engineering majors may elect to include in their program from four to six specially designed courses in French. The actual number of courses is dependent on competency in French and is determined in consultation with an adviser. Courses in engineering taken at French institutions during a student’s attendance at the Stanford Paris Program, as well as internships in French firms, may count as part of this extended major. Admission to engineering courses in Paris requires an advanced proficiency level, to be determined with a department adviser. Engineering majors successfully completing a major in French are also eligible for a Certificate of Advanced Proficiency in French upon their passing an official proficiency test for technological and scientific French sanctioned by the French government. This certificate, which is noted on the official transcript, is widely accepted in French-speaking countries of the European Union and in most Francophone countries throughout the world as guaranteeing the certificate holder’s high-level competency in French. Engineering students wishing to extend their major to include French and to include Paris Program courses and internships in France must consult closely with advisers in Engineering, French, and Overseas Studies.

The program includes the following courses given in French specially designed for students in technology and science:
126. Technological and Scientific French | 3-5
127. French Media and Communications | 3-4
128. Technocratique | 3-5
129. Advances of Technology in Europe | 3-5

Two courses in Engineering have discussion sections in French (see below under content-base discussion sections):
50. Introductory Science of Materials | 1-3
60. Engineering Economy | 1-3

The School of Engineering, the Department of French and Italian, and the Stanford Overseas Studies Office have information on engineering courses offered through the Stanford Center in Paris by affiliated French institutions (Ecole Polytechnique, Ecole des Mines, Conservatoire national des Arts et Metiers).

FRENCH AND EUROPEAN STUDIES

Students wishing to major in French with an emphasis on European Studies may combine department offerings with courses given within the departments of History and Political Science, and the Program in International Relations. This path includes 12 units in language-related courses numbered above 100 (any three of the French 120 series) and 12 units in three basic culture and literature courses (French 130, 131, 132, 133). Three additional department courses above 100 must be taken for 12 units in the areas of culture, history, economics, or politics. Courses outside the department, determined in consultation with the department adviser, must include four courses with a total of 18 units to be taken in related areas of history, international relations, or political science, including 8-12 units taken at an approved program in France.

The following is one example of a concentration in this track.
French Language, Basic Culture, and Literature:
120. France Today 3
121. Business French 3
123. Creative Writing 4
125. Contemporary French Usage, Spoken and Written 4
130. Middle Ages and Renaissance France 4
131. 17th- and 18th-Century France 4
132. 19th- and 20th-Century France 4
261. Stylistics and Textual Analysis 4
Subtotal 30

Advanced Courses in French:
127. French Media and Communications 4
190Q. Paris in History, Literature, and Film 4
279. Society and Culture: 19th- and 20th-Century France 4
292. French Democracy vs. British Liberalism 4
Subtotal 12

Other Courses:
Pol. Sci. 116A, B, or C. European Politics and Society 5-10
Other related courses from Stanford Paris Program or another approved program in France in history, international relations, or French culture/literature 8-13
Subtotal 18
Total units 60

FRENCH AND LINGUISTICS

Students wishing to major in French with an emphasis on linguistics may combine offerings in French with courses given by the Department of Linguistics. This program includes 12 units in six French language-related courses numbered above 100 and 12 units in three of four basic culture and literature courses (French 130, 131, 132, 133). Three additional French courses above 100 must be taken for 12 units, including 4 units in history of the French language and 8 units in stylistics, pronunciation, and phonetics. Courses outside the department, determined in consultation with the department adviser, must include four courses with a total of 16 units to be taken in related areas of linguistics. Linguistics 1, Introduction to Linguistics, is required within the latter group and should be taken first.

The following is one example of a concentration in this track.

French Language, Basic Culture, and Literature:
120. France Today 3
121. Business French 3
123. Creative Writing 4
125. Contemporary French Usage 4
130. Middle Ages and Renaissance France 4
131. 17th- and 18th-Century France 4
132. 19th- and 20th-Century France 4
261. Stylistics and Textual Analysis 4
Subtotal 27

Advanced Language Courses in French and other Departments:
262. Pronunciation and Phonetics 4
Classics 205A, B. The Semantics of Grammar 4
Subtotal 12

Courses in Linguistics:
1. Introduction to Linguistics 4
110. Phonetics and Phonology
or 120. Syntax
or 130. Semantics, Pragmatics 4
146. Language and Gender 4
150. Language in Society 4-6
Subtotal 16-18
Total units 55-57

FRENCH AS A DOUBLE MAJOR

Students considering a double major in French are encouraged to design a course of studies that fosters their understanding of the interaction between French and their second area of expertise. A minimum of 56 units of undergraduate work beyond the French 23 level must be completed.

Requirements for the double major include one advanced language course (from the 120 series, or 261), three of the introductory series on French and Francophone literature and culture (130, 131, 132, 133), and a minimum of ten additional courses (40 units). These courses, which must have a significant French component, are selected from the 200-level courses offered by the French Section. The remaining six courses (24 units), which must have a significant French component, may be taken outside the department and are selected in consultation with the French undergraduate adviser. The adviser also determines which courses taken at the Stanford in Paris Programs may count toward the major.

HUMANITIES

Students who wish to supplement their department major with a related program of studies should see the "Humanities Special Programs" section of this bulletin.

EXTENDED MAJORS

French and English Literatures—In addition to the requirements for the A.B. in French, candidates complete four English literature courses numbered 100 or above related to their French program. Two English literature courses may be applied toward the four electives in French.

French and Italian Literatures—In addition to the requirements for the A.B. in French, students complete four Italian courses numbered 200 or above related to their concentration in French.

English and French, and Italian and French—English majors and Italian majors interested in a combined degree with French should refer to "Extended Majors" in the English and Italian sections of this bulletin.

MINORS

Students considering a minor in French are encouraged to design a course of studies that fosters their understanding of the interaction between French and their second area of expertise. A min-
minimum of 24 units of undergraduate work beyond the French 23 level must be completed.

Requirements for the minor include one advanced language course (to be chosen from 123, 125, and 261); three of the introductory series on French and Francophone literature and culture (130, 131, 132, 133); and a minimum of two additional courses in language or literature numbered 126 and above. Of these, only one may be taught in English (courses in the 'E' series). All courses must be chosen in consultation with the Director of Undergraduate Studies who is responsible for evaluating all requests and individual study plans for the minor.

HONORS PROGRAM

Majors in their junior year may apply to the honors program if they have already taken five upper-division courses with a grade point average (GPA) of 'B+.' The honors program candidate must fulfill all regular requirements for the A.B. in French and write a substantial essay on an aspect of French culture. Preferably in the Spring Quarter of the junior year, the qualified student submits to the major adviser a detailed outline of the proposed essay. Upon approval of the project by the Faculty Council, the student may receive 9 to 12 units of credit in French 198.

STANFORD IN PARIS

The Stanford Program offers undergraduates the opportunity to study in Paris during the Autumn and Winter Quarters in a range of academic options, including course work at the Stanford center at the University of Paris and at other university-level institutions. The program gives students the opportunity to pursue a wide variety of interests through work at Paris universities, independent studies, and internships. In addition, the program promotes a high degree of interaction with the local community through volunteer work and homestays. The minimum language requirement is one year of French at the college level.

Courses offered in Paris may count toward the requirements of the French major or minor. New offerings at the Stanford home campus and in Paris encourage engineering students to study abroad and to coordinate internships through the department to work in France. All students are encouraged to consult with the French undergraduate adviser before attending the program and after returning in order to ensure that course work and skills acquired abroad can be coordinated appropriately with their degree program upon return. Detailed information, including program requirements and curricular offerings, may be obtained in the “Overseas Studies” section of this bulletin, the Paris website /http://www-osp.stanford.edu/Paris/ or from the Overseas Studies Office in Sweet Hall.

GRADUATE PROGRAMS

Admission to the Program—Applications and admissions information may be obtained from Graduate Admissions, the Registrar’s Office. Applicants should read carefully the general regulations governing degrees in the “Graduate Degrees” section of this bulletin. They should have preparation equivalent to an undergraduate major in French with a minimum grade point average (GPA) of 'B+' and should also have reached a high level of speaking proficiency and all language skills. Previous study of a language other than French is highly desirable. Recent Graduate Record Examination (GRE) results are required.

MASTER OF ARTS

(TERMINAL PROGRAM)

The terminal A.M. in French provides a combination of language, literature, cultural, and methodology courses designed to prepare secondary school, junior college, or college teachers.

Candidates must complete a minimum of 36 units of graduate work, with an GPA of 'B.' and pass a final examination. To fulfill the requirements in one year, enrollment must be for an average of 12 units per quarter.

Applications for admission must be received by May 31. Candidates for this degree are not eligible for financial aid and may not apply to the Ph.D. program during their year of study.

REQUIREMENTS

The basic program of 36 units consists of the following:

1. One methodology course (260)
2. One cultural history course
3. A course in stylistics and textual analysis (261 or equivalent)
4. Remaining units in advanced literature courses (200 level or above), three of which must focus on the prerevolutionary period

Stylistics and Textual Analysis (261) is designed to assure that both advanced undergraduates and graduates have achieved a high level of proficiency in written, expository French and the competency required to deal with the appropriate discourse of literary criticism, including the relationship between the written and spoken exposure. Graduate students already having achieved a high degree of competency in writing (either at Stanford or elsewhere) may, with the approval of the adviser, be exempted from this requirement upon presentation of significant writing samples showing the original criticism by the reader, for example, course or term papers. Such writing samples must be submitted to the current instructor of 261 before the end of Autumn Quarter.
EXAMINATION

The terminal A.M. examination is normally administered two weeks before the end of the Spring Quarter by the three members of the examination committee, selected each year by the chair. It consists of two parts:

1. The written exam (two hours) tests the candidate's general knowledge of French literature and is based on the terminal master's reading list.

   The candidate answers four questions (out of six) in a manner that demonstrates his/her ability to synthesize and draw parallels between periods, genres, and systems of representation. At least one question must be answered in French and two in English. A dictionary is allowed.

   Should the candidate fail the A.M. written exam, he/she is given a second (and final) chance at the end of the Spring Quarter. Questions in this second test focus on the candidate's weaker areas.

2. The oral exam (one hour) tests the candidate's competence in textual analysis. The candidate gives a commentary in French of a text selected by the examination committee from the terminal A.M. reading list.

DOCTOR OF PHILOSOPHY

Stanford's Ph.D. program in French encourages students both to develop a command of French literature and culture and to integrate their specialization with work in related disciplines, including cultural studies, film, Francophone studies, gender studies, humanities, literary theory, philosophy, political theory, and teaching pedagogy.

Students admitted to the program work closely with the graduate adviser in structuring a plan appropriate to their needs and interests. Aside from the benefits of the program's highly flexible structure, a number of unique resources are available to the students. The French Section's exchange program with the Ecoles Normales Supérieures provides selected candidates with the opportunity to pursue dissertation research in Paris.

REQUIREMENTS

A candidate for the Ph.D. degree in French must complete at least 72 units of graduate-level study beyond the bachelor's degree and teach five language courses in the section.

The A.M. or its equivalent in French is required of all Ph.D. students. This degree may be obtained during the course of study for the Ph.D. Students entering with a master's degree or previous graduate work receive credit as determined on a case-by-case basis, up to a maximum of 36 units. Fellowship funding and teaching requirements are adjusted according to University regulations.

Course requirements are as follows:

1. Students develop their knowledge of French literature and culture by taking a minimum of eleven courses (56 units) to be chosen from the 200 series. A maximum of two of the courses listed under the rubric "General Courses" may be included if work in these courses is done in French (see below).

   Students select these courses in consultation with the graduate adviser, on the basis of the following criteria: (a) exposure to all periods of French literature and culture, and (b) in-depth work in the student's chosen field. A maximum of 24 units outside the French Section may be accepted.

2. Students complete the remaining course requirements by doing work commensurate with their specific interests and additional areas of specialization (for example, courses on French cinema, linguistics, critical theory, Old French language, gender, Francophone culture and literature).

   The Ph.D. Qualifying Examination—The qualifying examination, which normally takes place at the beginning of Spring Quarter of the second year, consists of two parts:

   1. A written exam (four hours): the written exam tests the candidate's general knowledge of French literature based on the general reading list. For the purposes of this examination, the candidate selects three contiguous periods of French literature on which to be tested. She/he answers four questions (out of six) in a manner that demonstrates the ability to synthesize and draw parallels between periods, genres, and systems of representation. At least one question must be answered in French and one in English. A dictionary is allowed.

   Should the candidate fail the written exam in the Spring Quarter, he/she is given a second (and final) opportunity at the end of the summer. Questions in this second test focus on the candidate's weaker areas.

   2. An oral exam (one and one-half hours): the oral exam tests the candidate's competence in textual analysis. The candidate gives a commentary in French of a text selected, with due consideration of student input, by the Qualifying Examination Committee from the candidate's probable or chosen area of specialization. The student is given the designated text 48 hours before the scheduled examination. The candidate is allowed to bring to the examination informal notes, but not a previously prepared text. A brief question and answer period follows the student's commentary.

   Upon successfully completing the qualifying examination, the student may apply for conferral of the master's degree and advancement to Ph.D. candidacy. University regulations
require advancement to candidacy by the end of the sixth quarter.

Languages—It is recommended that doctoral candidates be competent in Latin and a second Romance Language. This choice may vary according to the candidate's area of specialization.

University Oral Examination—After successfully completing the qualifying examination and forming a doctoral committee, the candidate normally takes the University oral examination no later than the end of the third year of studies. The examination is primarily a defense of the dissertation proposal, which candidates prepare and submit well in advance of the examination date, with the aid of their doctoral committee.

The examination consists of:

1. A 30-minute presentation of the dissertation proposal, followed by a brief question period.
2. A discussion of aspects of the dissertation proposal (such as subject, scope, structure, methodology, and bibliography) on the basis of a written proposal submitted one month in advance by the candidate.

The examination seeks to assure the scholarly validity of the project and the candidate's ability to complete it successfully. See the "Graduate Degrees" section of this bulletin for University regulations.

Dissertation—The doctoral dissertation should demonstrate the ability to carry out research, organize, and present the results in publishable form. The scope of the dissertation should be such that it could be completed in 12 to 18 months of full-time work.

JOINT DEGREES AND MINORS

A candidate may also take a joint degree in French and Humanities, as described in the "Humanities Special Programs" section of this bulletin. Minors are possible in Comparative Literature, Italian, Linguistics, Modern Thought and Literature, and other departments offering related courses such as History, history of art, Music, Philosophy, Spanish, and so on.

Students interested in a joint degree or a minor should design their course of study with their adviser(s). Joint degrees and minors usually require 24 additional units. With careful planning, students may complete course work for the Ph.D. and the minor in a total of nine quarters.

Ph.D. MINOR IN FRENCH LITERATURE

The department offers a minor in French Literature. The requirement for a minor in French is successful completion of 24 units of graduate course work in the French Section with a GPA of 'B' or above. Interested students should consult the graduate adviser.

ITALIAN SECTION

The Italian Section offers a variety of graduate and undergraduate programs in Italian language, literature, culture, and intellectual history. Course offerings range from small and highly specialized graduate seminars to general courses open to all students on authors such as Dante, Boccaccio, and Machiavelli.

On the undergraduate level, a number of options are available. In addition to the Italian major, students may choose from a minor in Italian, an honors program in the Humanities (see the "Humanities Special Programs" section of this bulletin), an honors program in Italian, and two extended majors—one in Italian and French literature and one in Italian and English literature.

On the graduate level, programs of study leading to the A.M. degree and the Ph.D. degree are offered in Italian literature. Joint programs for the Ph.D. degree with the graduate programs in Comparative Literature, Humanities, and Modern Thought and Literature are also available.

Special collections and facilities at Stanford offer the possibility for extensive research in Italian studies and related fields. These include the undergraduate and graduate libraries and the Hoover Institution for the Study of War, Revolution, and Peace. Collections in Green Research Library are especially strong in the Medieval, Renaissance, and contemporary periods; the Italian section is one of the larger constituents of the Western European collection at the Hoover Library; and the Music Library has excellent holdings in Italian opera.

STANFORD IN ITALY

Stanford in Florence affords undergraduates with at least three quarters of Italian the opportunity to take advantage of the unique intellectual and visual resources of the city and to focus on two areas: Renaissance History and Art, and Contemporary Italian and European Studies. The program is structured to help integrate students as fully as possible into Italian culture through homestays, Florence University courses, the Language Partners Program, research, internship and public service opportunities, and by conducting some of the program's classes completely in Italian. Many of the courses offered in Florence may count toward the fulfillment of requirements for the Italian major or minor. Students are encouraged to consult with the Italian undergraduate adviser before and after a sojourn in Florence to ensure that their course selections meet Italian Section requirements. Information on the Florence program is available in the "Overseas Studies" section of this bulletin, the Florence website http://www-osp.stanford.edu/Florence/ or at the Overseas Studies Office, Sweet Hall.
BACHELOR OF ARTS

The Italian major offers students the opportunity to develop an in-depth knowledge of Italian literature, language, and civilization through a highly flexible program combining course work in Italian with work in such fields as art history, classics, comparative literature, economics, English, French, history, international relations, music, philosophy, and political science. All Italian majors are required to have completed two second-year language courses: Italian 21, 22, and/or 23 (or the equivalent taken at the Florence campus). Students considering an Italian major should consult with the Italian undergraduate adviser as early as possible (even before completing the language requirement) in order to ensure a maximum of flexibility in designing a course of study suited to individual needs and cultural interests.

Italian majors must complete 60 units of course work above the 100 level.

The remaining requirements for the major are the following:
1. A minimum of 32 units of Italian courses (selected from courses numbered 100 and above).
2. Of these courses, at least one on Dante is required, as well as at least one in each of the following areas: (a) the Middle Ages, (b) the early modern period, and (c) the modern period. A Dante course may fulfill the Middle Ages requirement.
3. The intermediate-level survey sequence (Italian 127, 128, 129).
4. One advanced language course beyond the level of Italian 114.

Of the 60 units required for the major, up to 28 units of course work in related fields may be taken outside the department.

EXTENDED MAJORS

Requirements for both extended majors are essentially identical to those of the Italian major with a concentration in Italian literature.

Italian and English Literatures—In addition to the 32 units required for the A.B. in Italian, candidates must complete four English literature courses numbered 100 and above related to the field of concentration in Italian Studies.

Italian and French Literatures—In addition to the 32 units required for the A.B. in Italian, candidates must complete four French literature courses numbered 100 and above related to the field of concentration in Italian Studies.

MINORS

Students considering a minor in Italian are encouraged to design a course of studies that fosters their understanding of the interaction between Italian and their second area of expertise. A minimum of 24 units of undergraduate work beyond the Italian 3 level must be completed.

Requirements for the minor include two intermediate language courses (to be chosen from 21, 22, and 23); all three of the introductory series on Italian literature and culture (127, 128, 129); and a minimum of one advanced course in language or literature numbered 114 and above. All courses must be chosen in consultation with the Director of Undergraduate Studies, who is responsible for evaluating all requests and individual study plans for the minor.

LA CASA ITALIANA

La Casa Italiana, 562 Mayfield, is an undergraduate residence devoted to developing an awareness of Italian language and culture. It works closely with the Italian Cultural Institute in San Francisco and with other local cultural organizations. It often hosts visiting representatives of Italian intellectual, artistic, and political life. A number of departmental courses are regularly taught at the Casa, which also offers in-house seminars. Assignment is made through the regular undergraduate housing draw.

HONORS PROGRAMS

ITALIAN

Italian majors with a grade point average (GPA) of 'B+' or better in all Italian courses are eligible for department honors. In addition to the requirements listed above, honors candidates must complete an honors essay representing 6 to 9 units of academic work through enrollment in Italian 198. Proposals for essays must be submitted to the Italian faculty by the end of the candidate’s junior year. If the proposal is accepted, a member of the Italian faculty is assigned to serve as the student’s adviser for the essay. Students interested in the honors program should consult the Italian undergraduate adviser early in their junior year.

HUMANITIES

An honors program in the Humanities is available for Italian majors who wish to supplement their studies with a carefully structured program of humanistic studies. See the “Humanities Special Programs” section of this bulletin for further information.

GRADUATE PROGRAMS

Admission to the Program—Although they need not have been undergraduate Italian majors, candidates are expected to be proficient in the Italian language and to have done significant course work in Italian literature and/or Italian studies on the undergraduate level. Candidates
with a broad humanistic and linguistic background are especially encouraged to apply. Contact Graduate Admissions, the Registrar’s Office for application information. Recent Graduate Record Examination (GRE) results are required.

**MASTER OF ARTS**

*(TERMINAL PROGRAM)*

The A.M. in Italian provides a combination of language, literature, civilization, and general courses designed to prepare secondary school, junior college, or college teachers. Applicants should be undergraduate majors in Italian or in a related field. Knowledge of a second Romance language is desirable.

Candidates must complete a minimum of 36 units of graduate work, with an GPA of ‘B,’ and pass a comprehensive oral examination. To fulfill the requirements in one year, students should enroll for an average of 12 units per quarter.

The basic course program (36 units) is nine graduate courses in Italian, one of which may be in a related field. The option of substituting a master’s thesis for two literature courses is available.

Reading knowledge of a second Romance language is required. French is recommended.

Requirements for the completion of the A.M. include a comprehensive literature and language oral examination, which is given before the end of Spring Quarter or at the beginning of the following Autumn Quarter. Before taking the exam, a candidate for the degree must submit to the Italian faculty a sample graduate seminar paper representative of the quality of his or her graduate work. On the basis of this paper, the results of the comprehensive examination, and the student’s overall progress, members of the department vote for or against awarding of the A.M. degree.

Applications for admission must be received by May 31. Candidates for this degree are not eligible for financial aid.

**DOCTOR OF PHILOSOPHY**

Stanford’s Ph.D. program in Italian offers the opportunity for advanced work in Italian literature and Italian studies within an unusually flexible interdisciplinary framework. It is fully independent of the Ph.D. program in French and aims to encourage students to bring broader methodological and interdisciplinary concerns to bear on the study of Italian literature. Like conventional Italian Ph.D. programs, it places primary emphasis on developing a command of Italian literature as a whole. Unlike conventional Italian Ph.D. programs, it allows students to construct a highly individualized course of study, integrating specialization in a particular literary period with work in such fields as art history, classics, comparative literature, feminist studies, film, French, history, history of science, linguistics, literary theory, Medieval or Renaissance studies, philosophy, and religion. The program is founded on the belief that this sort of balance between period specialization and interdisciplinary breadth is not only desirable but also essential in a small field such as Italian studies, particularly given the diversity of the Italian literary canon, which extends over a wide variety of disciplines.

Students admitted into the Ph.D. program in Italian work closely with the adviser in structuring a plan of study appropriate to needs and interests. Such a plan usually involves a mix of teaching and courses taken within the Italian program, courses taken in other departments, and independent work under supervision of a member of the Italian faculty, thus integrating financial support with training as scholars and prospective universitv teachers. Assuming satisfactory academic progress, fellowships are offered for three or four years. Graduate-level work completed elsewhere may be counted as fulfilling part of the requirements for the degree. Students in the fifth year normally apply for outside fellowships or part-time teaching positions in the department.

Aside from the benefits of the program’s structure and fellowship plan, a number of unique resources are available to Ph.D. students in Italian at Stanford. During their years of study, students may be permitted to take courses, pursue dissertation research, and do independent work at the Stanford campus in Florence under supervision of a member of the Italian faculty. The Florence center, located in *apalazzo* along the Arno, is near important Florentine libraries and archives and the University of Florence. An additional resource is the graduate student publication, *Constructions*, a scholarly journal published twice annually by the Department of French and Italian. Graduate students also have at their disposal the resources of La Casa Italiana, a residential theme house which serves as an Italian cultural center and hosts such events as colloquia, lectures, and film series.

**REQUIREMENTS**

*Residency and Course Work*—In accordance with University regulations, candidates for the Ph.D. must complete at least nine quarters (three years) of full-time work, or the equivalent, in graduate study beyond the bachelor’s degree. For a graduate student entering with an A.B., the Ph.D. program should normally be completed in four years. The first year is devoted to full-time study, the second and third years to teaching and the completion of course requirements (for a total of no fewer than 72 units of graduate work), and the fourth to dissertation work. Students entering with a master’s degree receive credit for previous graduate work as determined on a case-by-case basis, up to a maximum of 36 units. Fellowship fund-
ing and teaching requirements are adjusted according to University regulations.

Students should read carefully the general regulations governing degrees in the "Graduate Degrees" section of this bulletin.

Teaching—In addition to training capable and creative scholars, one of the program's primary objectives is to promote the effective teaching of Italian at all levels. To this end, students teach three or five Italian language courses (normally during the second and third year). During the first term of teaching, students must enroll in Italian 301, Graduate Workshop on Pedagogy, a seminar which permits working closely with a master-teacher and involves a regular schedule of class visitations.

Language—As soon as possible, but not later than the end of the third year, the candidate must have passed reading examinations in two additional foreign languages. If the candidate's period of concentration is earlier than the Roman period, one of these must be Latin; if Roman or later, French. Completion of the language requirement is a prerequisite for taking the University oral examination.

Course Requirements—In the first three years of study, two courses are required: French and Italian 279E, Colloquium on Research Methods in French and Italian Literature; and Italian 301, Graduate Workshop on Pedagogy. Apart from this requirement, students are granted considerable freedom in structuring a course of study appropriate to individual needs. During the first year, most course work is usually done within the Italian Section in order to ensure an adequate preparation for the qualifying examination. In the second and third years, students' programs normally consist of a combination of course work done inside and outside the Italian Section, supplemented by tutorials and independent work pursued under supervision of the Italian faculty.

Qualifying Procedures—Students are admitted on a probationary basis. The probationary period ends once a student is officially admitted to "candidacy" for the Ph.D. as a result of successful completion of the qualifying procedure. The qualifying procedure takes place at the end of the third or during the fourth quarter of graduate study, at which time the student: (1) takes the oral qualifying exam (equivalent to the master's exam), and (2) submits to the Italian faculty a sample graduate seminar paper which the student considers representative of the quality of his or her graduate work at Stanford. On the basis of this paper, the results of the qualifying examination, and the student's overall progress, the faculty makes its recommendation to the department vote for or against admission to candidacy. The terminal A.M. degree is awarded to students who have successfully completed the oral qualifying exam but who are not admitted to candidacy for the Ph.D.

Examinations—Two oral examinations are required of candidates for the Ph.D.: the qualifying examination (mentioned above), and the University oral examination.

1. The qualifying examination tests the student's general knowledge of the Italian language and literature and is taken at the end of the third or during the fourth quarter of graduate study. It is composed of two sections, the first consisting of a 20-minute presentation by the candidate, the second of a 70-minute question and answer period on the candidate's talk and on his or her reading list. The examination committee for the qualifying examination is made up of the members of the Italian faculty, including the student's faculty adviser who chairs the examination. While the reading list for the qualifying examination must be based on the department's standard list, it should be amplified in consultation with the student's adviser so as to reflect each student's particular areas of interest.

2. The University oral examination is normally taken at the end of the third year of graduate study or at the beginning of the fourth year. The reading list for the oral examination must be established in consultation with the student's dissertation director, who chairs a committee of readers (usually three) selected jointly by the dissertation director and the student according to the list's emphasis. The University oral examining committee is ordinarily drawn from the committee of readers for the dissertation. Reading lists for the University oral generally cover all periods of Italian literature, with the student's area of specialization, the primary focus, covered in depth. Aside from this general guideline, students are given considerable latitude in establishing a list which reflects their individual scholarly concerns.

The examination is divided into four sections. The first, 30 minutes, consists of a formal presentation addressing one of the questions that the student received the morning of the examination. The second, also 30 minutes, is a question and answer period concerning the student's presentation. The third, one hour, takes the form of an oral colloquy on the student's reading list as a whole. The fourth, lasting 30 minutes, is allocated to defense of the student's dissertation proposal (a copy of which is submitted to the examiners one week in advance of the examination). Successful completion of the examination constitutes approval of the proposal.

Dissertation—The fourth and (if necessary) fifth years of graduate study are devoted to writing and researching the doctoral dissertation.
JOINT DEGREES AND MINORS

A joint degree program in Humanities and Italian Literature is described in the "Humanities Special Programs" section of this bulletin. Minors are possible in a wide variety of related fields. Joint degree programs and minors frequently require 24 additional units of work, making completion of all course requirements in nine quarters difficult if careful advance planning is not done.

Ph.D. MINOR IN ITALIAN LITERATURE

The section offers a minor in Italian Literature. The requirement for a Ph.D. minor is a minimum of 24 units of graduate course work in Italian literature. Students interested in a minor in Italian should consult the graduate adviser.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

GENERAL

These courses are open to all undergraduate and graduate students, are taught in English, and do not require a knowledge of French or Italian.

40N. Stanford Introductory Seminar: Fascism and Culture—(Same as Comparative Literature 40N.) Preference to freshmen. Interdisciplinary. Fascist and right-wing modernist cultural production in art, architecture, literature, and industrial design. The cultural, intellectual, and political prehistory and history of fascism in France, Germany, Italy, and Spain, emphasizing the connections and conflicts between totalitarian politics and modernist artistic forms. GER:3a,4c (DR:2 or 7)
3 units, Aut (Schnapp)

47N. Stanford Introductory Seminar: Camus—Preference to freshmen. Camus' thoughts encompass the major themes of the 20th century: the question of freedom, the issue of commitment, the difference between rebellion and revolution. He refused to give in to extremist passions. The literary part of Camus' work is inseparable from his philosophical theory. Recent biographies of Camus, along with his main works, are read to understand how his views can guide us to the end of the 20th century. Camus enlightens us about contemporary problems and foresaw the complexity of the issues linked to the advent of modernity.
3 units, Spr (Apostolides)

133E. Literature and Society: Introduction to Francophone Literature from Africa and the Caribbean—Focuses on major African and Caribbean writers and major issues raised in literary works which reflect the changing aspects of the societies and cultures of Francophone Africa and the French Caribbean: meeting the challenge of acculturation and the search for identity; of tradition competing with modernity; the use of oral tradition and writing; women's role and status; writers' social responsibility. Visual material; readings from fiction, poetry, plays, and criticism. GER:3a,4a (DR:2 or 7)
4 units, Win (Mudimbe-Boyi)

166E. Women's Voices in Contemporary Italian Literature—Introduction to 20th-century women's writing in Italy, from Sibilla Alerama's A Woman to the narrative experiments of the last decade. Readings: Dacia Maraini, Fabrizia Ramondino, Francesca Duranti, and Rosetta Loy. Texts in translation. GER:3a (DR:7)
4 units, Aut (Springer)

191E. Women in Italian Cinema—The role of women in Italian cinema. Analysis of the female subjects (female gaze/female identity) through a historical, technical, and narrative frame. Emphasis is on the interlinked issues of gender, identity, and sexuality with reference to the recent developments in feminist film theory.
4-5 units, Spr (Campani)

192E. Images of Women in French Cinema: 1930-1990—The myth of the feminine idol in French films is understood by placing it in its historical and cultural context. The mythology of stars was the imaginary vehicle that helped France to change from a traditional society into a modern nation after 1945. Analysis of films from Renoir to Truffaut and Nelly Kaplan, the evolution of the role of women in France over 60 years. Lectures in English. Films in French, with English subtitles. GER:4c (DR:†)
3-5 units, Spr (Apostolides)

201E. Definition and Inquiry: Colloquium on Research Methods in French and Italian—Acquaints graduate students with general and specialized resources for French and Italian studies. Emphasis is on overall strategy for research, exploring bibliographical sources in the students' fields of interest.
3 units, Aut (Parrine)

208E. Female Saints—The medieval lives of saintly women. Traditional motifs in the portrayal of perfection (the saint as founding hero); perfection in the literary context of 12th- and 13th-century France (the Lady as Saint); and the rhetorics of female perfection (the body sacrificed). Readings from medieval poems in English translation. Limited enrollment. GER:3a,4c (DR:8†)
4 units, Aut (Cazelles)

214E. Images of the Afterlife—The way the afterlife has been imagined and represented in ancient and medieval literature, up to Dante. Readings: the epic of Gilgamesh, Book XI of The Odyssey, selections from Plato's Republic and Phaedo, Book VI of Virgil's Aeneid. St. Paul, and selections from the three canticles of Dante's Divine Comedy.
4-5 units, Spr (Harrison)
221E. Language, Meaning, and the Making of Poetry—Languages are not spoken but merely repeated. Communication is carried out through ready-made expressions, coined and “notarized” by the simplifiers of meaning (politicians, entertainers, etc.) and those who have gained control of the media the “perverters of language” in the words of Ezra Pound. That which enables human beings to widen the circle of information deprives them of the awareness to make that information relevant. Aiming at language warfare against the abusers of language, the course analyzes modern and contemporary speech (sound bites, sit-com dialogues, political and academic addresses), and the history of the philosophic and poetic discourses on language. Selections from Plato, Aristotle, Dante, Rabelais, Vico, Rousseau, Nietzsche, Pound, Heidegger and Derrida.

4-5 units, Win (Ballerini)

223E. Literature and Psychoanalysis—Literature has held a central place in psychoanalysis since its inception, as the concept of the Oedipus Complex shows. Psychoanalytic insights have seeped into literature and literary criticism. Yet, recent developments concerning creativity, the relation of delusion to illusion, the process of symbolisation, have stayed outside the confines of literary study. Focus is on psychoanalytic investigations of literature (Freud, Hanna Segal, Meltzer, Lacan) and examples of psychoanalytic literary criticism. The limits of a psychoanalytic approach to literature.

3-5 units, Spr (Hullot-Kentor)

224E. Psychoanalytic Theory of Femininity—Freud’s psychoanalytic theory of women and object-relations theories which shaped the debates over female psychology since Freud. Readings: Freud, Horney, Chasseguet-Smirgel, Benjamin, Butler. GER:3a (DR:8)

3-5 units, Win (Harrison)

247E. Fictions of the Self: First Person Narration in Modern Europe—A tradition of pseudo-Confidences which critiques, parodies and offers a substitute for the traditional confessional narrative; works in which talking about oneself constitutes not an act of self-description but a feat of self-construction.

Readings: Mary Shelley, Benjamin Constant, Fyodor Dostoevsky, Albert Camus, Marguerite Yourcenar, Ralph Ellison.

4 units, Win (Landy)

252E. Languages, Structures, and Societies: An Introduction to Structuralism—(Same as Comparative Literature 252E.) Analysis of the background and basic concepts of structuralism. Readings: Ferdinand de Saussure, Course in General Linguistics; Roland Barthes, Elements of Semiology; Lévi-Strauss, Mythologies, and from George Dumézil, Luc de Heush, and Edmund Leach. GER:3a (DR:7)

3-5 units, Win (Mudimbe)

254E. Introduction to French Philosophy: From 1943 to the Present—From the glorification of subjectivity (existentialism) to the funerals of the subject (structuralism, post-structuralism, deconstruction) to a modest theory of agency in the contemporary revival of social, moral, and political philosophy.

Readings: Sartre, Camus, Lévi-Strauss, Lacan, Foucault, Bourdieu, Derrida, Dumont, Levert, Castoriadis, Ricoeur, Manent, Dupuy, Ferry, Renault, Gauchet. GER:3a (DR:8)

3-5 units, Spr (Dupuy)

259E. Paradigms of Modern Thought: Michel Foucault and the Archaeology of Knowledge—(Same as Comparative Literature 259E.) Introductions to Michel Foucault’s theses and methods and their significance for the individuation and the specification of each culture and individual. Readings: main texts by Foucault and excerpts from Georges Canguilhem, George Dumezil, and Jean Hyppolite.

3-5 units, Win (Mudimbe)

263E. Love Books of the Middle Ages—Love in the Middle Ages was a topic for romance literature and for natural philosophy and theology. Some classic medieval texts probe the nature of love from many perspectives. Readings: Abelard’s History of My Calamities (exchange of letters with Heloise); Yvain and Lancelot; the Romance of the Rose; Dante’s Vita Nuova; selections from the Decameron; and Chaucer’s Troilus and Cressida.

4-5 units, Win (Harrison)

267E. 20th-Century Italian Poetry and the Experience of the War(s)—The works of 20th-century Italian poets vis a vis the experience of the War(s) and its aftermath. The redefinition of the Italian self; the status of poetry and the political role of the poet; the theory and practice of realism; the heretical redemption of the war and an alienated society; the diverse styles in which historical and political experience, theories of culture, and subjective and collective consciousness are articulated and represented. Theoretical readings recontextualize 1900-60 Italian poetry for the ‘90s.

4-5 units, Spr (Campani)

278E. Topics in French and Francophone Literature: Discourse on Self-Representation—Critical analysis of major issues relating to literatures in French and outside France, focusing on Negritude and Surrealism, the question of the Other, and the problematic of Identity. Readings: Césaire, Dadié, Kane, Glissant, Sartre, Barthes, and Todorov. GER:3a (DR:7)

3-5 units, Spr (Mudimbe-Boy)
critique and cultural productivity. This originated among university students and continued unfolding and transforming itself at the universities. "A utopian cultural revolution," the events preceding and following May 1968 are not settled in an established paradigm of interpretation, and are forgotten among younger generations. Analysis of original documents and contact with historical witnesses, reconstructs and rethink the "Students' Revolution."

3-5 units, Win (Apostolides, Gumbrecht)

284E. Women Writing in French: A Cross Cultural Perspective—Focuses on the topics of exile (geographical, cultural, or psychological), marginalization, and transgression as metaphors of women's condition in different cultures and societies within the Francophone world (France, Africa, Caribbean, and the Middle East). Emphasis is on how female subjectivity is recast through narrative modes, choice of literary conventions, and genres, with a discussion of the validity of Euroamerican feminist theories and assumptions when applied to different cultural contexts. Readings: Warner-Vieyra, Djebar, Accad, Liking, El Sadawi, Condé, etc. Films and videos. GER:3a (DR:7)

3-5 units, Win (Mudimbe-Boyi)

312E. The “Linea Longobarda”—A profile of Italian literature from Manzoni (as read by Gadda), the writers of the Scapigliatura (Dossi, Arrighi, etc.), Vittorio Imbriani, and Cesare Beccaria’s Ricerche intorno alla natura dello stile to Antonio Delfini, Tommaso Landolfi, Giorgio Manganelli, and Gadda. Analysis of Manzoni’s Adelchi. The structural and stylistic features that justify the subsumption of the above under a single umbrella. The parameters inherent in the Linea Longobarda. Readings in Italian.

3-5 units, Win (Ballerini)

357E. Of Madness: A Phenomenological Approach—What is madness? Is it possible of madness to face the difference it signifies in its own right as constituting its own system, with its own rules and norms? A view of Michel Foucault’s: “Now, with me, madness can speak in its own language.” Is it really possible for madness to speak about itself in a language which is not one of reason? Readings: Husserl, Brant, Erasmus, Burton, Tuke, Foucault, in French, German, or Spanish; Valenstein, Freud, and George Canguilhem.

3-5 units, Spr (Mudimbe)

370E. The Anthropology of Speed—Same as Comparative Literature 370.) A dialogue between the history of technology and cultural history (art, music, literature, film), seminar examines the formative impact of themes of speed, acceleration, and intensification on modern notions of experience, subjectivity, signification, power, and production. Topics: 18th-century coaching and the rise of amateur coaching; the rise of sporting and racing subcultures and sporting media during the early 19th-century; psycho-physical theories of thrill and shock; exercise and hygiene from the fin de siecle to the present; scientific management and the world of work; bodies and machines; cognitive and perceptual ramifications of aviation, mechanized ground transportation, film, and video; velocity, addiction, entertainment, and ennui. Authors: De Quincey, Marinetti, Virilio, Ballard.

5 units, Aut (Schnapp)

FRENCH SECTION

Note—Changes in course offerings after this bulletin has gone to print are sometimes necessary. Students are advised to consult the department bulletin board regularly. Courses are taught in French unless noted.

Introductory Language Courses (1-99)

Advanced Language Courses (100-125)

Courses in French, Technology, and Science (126-129)

Undergraduate courses in Literature and Culture (130-199)

Courses for Advanced Undergraduates and Graduates (200-299)

Graduate Seminars (300-399)

FIRST- AND SECOND-YEAR LANGUAGE

Note—Students registering for the first time in a first- or second-year course must take a placement test if they had any training in French before entering Stanford. Newly entering students may take the placement exam on-line during the summer or on campus on Saturday, September 20. In either case, the written exam must be followed by an oral interview administered by the Language Program Coordinator.

Basic French grammar and vocabulary are covered in French 1, 2, and 3, (or the 1X, 2X, 3X series), at the successful completion of which students will have acquired beginning level functional proficiency in listening comprehension, speaking, reading, and writing in satisfaction of the University Foreign Language Requirement. Students may continue with second-year French courses (22 or 23) or at a higher level upon recommendation of the Language Program Coordinator.

Auditing is not permitted in lower division language courses.

1. First-Year French (Part A)—Introduction to basic communication skills using an all-in-French, student-centered approach. Emphasis is on development of listening comprehension, oral skills, and written expression. Exposure to a variety of French and Francophone texts and videos in the development of authentic discourse. Utilization of language lab, multimedia, and computer facilities in the language learning process.

5 units, Aut, Win, Spr (Staff)
1X. First-Year French Projects (Part A)—First of five-quarter experimental series (1X, 2X, 3X, 22X, 23X). Introduction to basic skills through student-initiated projects intended to reinforce development of oral and written skills in a variety of situations (e.g., preparing original plays, video documentaries, WWW pages, etc.). Content depends on student interest. Utilization of language lab, multimedia, and computer facilities in the language learning process.
3 units, Aut (Barson)

2X. First-Year French Projects (Part B)—Continuation of 1X. Continued coverage of essential grammar (e.g., past and future tense narration) and the development of oral and written skills. Further study of French and Francophone texts and videos. Utilization of language lab, multimedia, and computer facilities in the language learning process. Prepares students for 3X.
5 units, Win (Barson)

3. First-Year French (Part C)—Continuation of 2. Completion of essential grammar (e.g., hypothetical conditions, subjunctive, etc.) and further development of oral and written skills. Intensive study of French and Francophone texts and videos, including plays, short stories, and authentic texts (e.g., Le Petit Prince). Utilization of language lab, multimedia, and computer facilities in the language learning process. Satisfies the University Foreign Language Requirement for undergraduates.
5 units, Win (Barson)

10. First-Year Conversation—Introduction to French conversation for students who have completed French 2 or equivalent. Topics: daily life, the media, the Francophone world, and intercultural communication. Emphasis is on authentic discourse.
2 units, Aut, Win, Spr (Staff)

15. Conversation in Everyday Life—Second-year French conversation for students who have completed French 3 or equivalent. Topics: the family, student life, films, theater, fashion, food, politics, and cross-cultural comparisons of the French-speaking world. Useful information for students planning to travel/study abroad. Prerequisite: 3 or equivalent.
2 units, Aut, Win, Spr (Staff)

15S. Intermediate Conversation—Summer session only. Second-year French conversation designed to improve communication in everyday situations. Topics: travel, student life, food, films, current events, etc. No auditors. Prerequisite: one year of college French or equivalent.
3 units, Sum (Staff)

20A. French and the Media—Second-year French conversation for students who have completed French 3 or equivalent. Discussion of contemporary France as seen through newspapers, magazines, videos, and multimedia. Use of actual footage from French TV broadcasts. Topics vary with current events. Prerequisite: 3 or equivalent.
2 units, Aut (Staff)

20B. French Cinema—Second-year French conversation for students who have completed French 3 or equivalent. Introduction to major French filmmakers, stars, and trends. Discussion in French of selected films. Prerequisite: 3 or equivalent.
2 units, Win (Servant)

20C. France and Francophonie—Second-year French conversation for students who have completed French 3 or equivalent. Exposure to regions of France and the Francophone world. Topics: travel, food, cross-cultural comparisons, etc. Useful information for students planning travel/study abroad. Prerequisite: 3 or equivalent.
2 units, Win (Servant)

22. Second-Year French (Part A)—Review of essential grammar (e.g., past, present, future narration) with emphasis on the development of authentic discourse through intensive study of French and Francophone short stories, plays, poetry, and L’Etranger. Utilization of language lab, multimedia, and computer facilities in the language learning process. Extra unit for individual or group projects (e.g., supplementary reading and written paper, creation of video or multimedia projects, classroom presentations). Prerequisite: one year of college French or consent of coordinator.
4-5 units, Aut, Win, Spr (Staff)

Note—Special sections of second-year French (22, 23) with emphasis on certain topics (communications, international studies, politics, law, trade, Francophone or women writers, etc.) can be arranged through the coordinator and are indicated in the Time Schedule by a suffix (e.g., 22F, 22W).

22X. Second-Year French Projects (Part A)—Continuation of five-quarter experimental series (1X-23X). Review of essential grammar; emphasis on communication skills using e-mail and classroom situations in the design and accomplishment of student-generated projects (e.g., writing a newspaper in collaboration with students at other universities, creating WWW pages, corresponding with students in France and other Francophone countries). Computers mediate exchanges and develop writing skills. Students may earn up to 3 additional
units for special projects. Prerequisite: one year of college French or consent of coordinator.

4-7 units, Aut (Barson)

23. Second-Year French (Part B)—Continuation of 22. Review of essential grammar (e.g., pronominal verbs, subjunctive) emphasizing further development of authentic discourse through intensive study of selected French short stories, plays, and La Symphonie Pastorale. Utilization of language lab, multimedia, and computer facilities in the language learning process. Extra unit for individual or group project (e.g., supplementary reading and written paper, creation of video or multimedia, classroom presentations, etc.) Prepares students for advanced courses and for study abroad. Satisfies the foreign language requirement for students majoring in International Relations. Prerequisite: 22 or equivalent or consent of coordinator.

4-5 units, Aut, Win, Spr (Barson)

23X. Second-Year French (Part B)—Continuation of 22X. Prerequisite: 22X, or equivalent or consent of coordinator.

4-7 units, Win, Spr (Barson)

24. Second-Year French: Review Topics—Intensive review of selected grammar points (e.g., literary tenses, indirect discourse, etc.). Intended to enhance literary texts in preparation for advanced courses and for study abroad. Readings include selected French and Francophone texts. Utilization of language lab, multimedia, and computer facilities in the language-learning process. Prerequisite: 23, 23X, or equivalent or consent of coordinator.

4-5 units, Spr (Staff)

40. Intensive French Specials—By petition only and with consent of instructor. Students with special programmatic needs for an alternate curriculum may complete 3-7 units through a combination of course work and tutorials. No auditors.

3-7 units, Sum (Staff)

41A,B. Intensive French for Beginners—Accelerated first-year course covering all essential grammar. An all-in-French method is used for developing competence in: listening, speaking, writing, and reading. Written exercises, compositions, conversational drills, and daily work in the language lab. No auditors.

9-12 units, Sum (Staff)

50. Reading French—For graduate students or seniors seeking to meet the University reading requirement for advanced degrees. Accelerated, designed specifically for the acquisition of reading ability. No auditors.

4 units, Aut (Staff)

ADVANCED LANGUAGE

101. Language Specials—With consent of department only. See instructor for section number.

1-5 units (Staff)

120. Advanced Conversation: France Today—Third-year conversation. Discussion of contemporary issues based on French newspapers, magazines, TV news broadcasts, videos, and films. May be repeated once for credit after an interval of two quarters. Prerequisite: 23 or equivalent.

3 units, Aut, Win, Spr (Staff)

121A,B. Business French—For students who wish to function and communicate in the French-speaking business world. 121A (Practicum) includes resume-writing and job applications process for on-site employment in 1998. 121B emphasizes readings, acquisition of specialized vocabulary, discussions and written work, including translations and business letters. Prerequisite: 22 or equivalent.

121A. 2 units, Aut (Servant)

121B. 3 units, Spr (Servant)

123. Creative Writing—Writing as practical communication and as literature. The cultural and social determinants in shifting from spoken to written French, formal and informal. Textual analysis and creative writing centered on various genres and styles (e.g., letters, essays, short stories, poems; description vs. narration). Grammar and vocabulary review. Class discussion in French focuses on model texts and original writing done by students. Prerequisite: 23 or equivalent. (WIM)

4 units, Aut (Hester)

125. Contemporary French Usage: Spoken and Written—Can serve as adjunct to Paris program. Grammar, syntax, and stylistics, emphasizing similarity and divergence of oral and written French. Some discussion of linguistics as applied to the analysis of texts and oral presentations.

4 units, Spr (Staff)

126. Technological and Scientific French—Introduction to the languages of science, technology, and research in contemporary France. Through a reading of historical texts and recent journal articles, the principal categories and characteristics of French technological and scientific discourse are analyzed. Topics: scientific method, approaches to research, and the interplay between science and society focusing on engineering and medicine. Technical vocabulary, reading strategies, and listening comprehension. Written exercises, oral presentations, and research paper. Accelerates proficiency for students at a second-year level. Learners uncertain of their level should take French placement test before the beginning of the quarter and/or consult with the instructor.

3-5 units, Aut (Courant)

127. French Media and Communications—For students interested in acquiring knowledge and developing practice in technical, legal, and business French. Examines technological policy of contemporary France in a historical perspective and in reference to contemporary issues in the French computing, broadcasting, telecommunications, and
multimedia industries. Readings from current journals are a basis for acquisition of specialized vocabulary. For extra unit, research paper or a multimedia presentation on a topic of choice. Prerequisite: 126 or equivalent or consent of instructor.

3-4 units, Win (Staff)

128. Technocritique—The French tradition of social and philosophical criticism of technology. The apparent contradiction between being at the forefront of technological and scientific development and the demand for prudence, because technological development is not always perceived as a synonym of social and moral progress.

3-5 units, Spr (Dupuy)

129. Advances of Technology in Europe: Bioengineering—Engineering in biology and medicine. How engineering (particularly electrical engineering) and applied mathematics are used in biological research and development; how engineering, electronics, mathematics, and physics conjoin to serve diagnostic procedures for the human bio-organism.

3-5 units, Spr (Prieur)

CONTENT-BASED DISCUSSION SECTIONS

Discussion sections and additional practice is given in French on specific topics, and determined by the syllabus of courses offered by other schools and departments.

1L. Introduction to Linguistics 1—French discussion section of Linguistics 1.

1-3 units, Win (Staff)

19M. Introduction to Music Theory—French discussion section of Music 19.

1-3 units, Aut (Staff)


1-3 units, Win (Staff)

60E. Engineering Economy—French discussion section of Engineering 50.

1-3 units, Aut (Staff)

LITERATURE AND CULTURE UNDERGRADUATE

130. Middle Ages and Renaissance France—Introduction to the literature and culture of France, 11th-16th century. Readings from the epics (The Song of Roland), medieval romances (Yvain, Chrétien de Troyes), post-Petrarchan poetics (Du Bellay, Ronsard), and prose humanists (Rabelais, Montaigne). Prerequisite: 23 or equivalent. GER: 3a (DR:7)

4 units, Aut (Cazelles)

131. 17th- and 18th-Century France—Introduction to the literature and culture of France from the Baroque to the Enlightenment. Readings: Corneille, Diderot, Molière, Montesquieu, Rousseau, and Voltaire. Criticism of excerpts from contemporary filmed versions of French “classical” literature. Prerequisite: 23 or equivalent. GER:3a (DR:7)

3-5 units, Win (Hulot-Kentor)

132. 19th- and 20th-Century France—An approach to the intellectual history of modern France, viewed as a recognition of and response to the “absurd.” A specifically modern crisis of subjectivity and of belief, accompanied by a broad range of responses; from art for art’s sake to existentialist revolt and the bitter laughter of the theater of the absurd. Readings are from poetry and drama, but indicate an overview of movements and styles from the period. GER:3a (DR:7)

4 units, Spr (Landy)

189Q. Stanford Introductory Seminar: Romance—Texts and Movies—Preference to sophomores. The concept of romance through an analysis of the “love story” motif in literature and cinema. The myth of Tristan and Isolde, of frustrated passion whose fatalistic overtone exerts a wide influence on Western imagination from medieval romance to contemporary movie makers. Focusing on salient components of the myth (the quest for love, its obstacles, and its tragic resolution), examines the various responses provided by texts and movies. The significance of the love story motif and the reason for its attraction.

4 units, Win (Cazelles)

190Q. Stanford Introductory Seminar: Paris in History, Literature, and Film—Preference to sophomores. From gallo-roman times, a personal reading of the city in history, literature, art, and architecture. Slides and films.

4 units, Spr (Bertrand)

192. Introduction to 20th-century French Literature—Reading/discussion of selected works from 20th-century French literature, centered on the interaction between literary texts and other social and cultural domains. Focus is on new forms and structures in poetry, theater, and novels illustrated by Surrealism, nouveau roman, and nouvelle critique. Emphasis is on words and images. Readings: Proust, Apollinaire, Robert Desnos, Ionesco, Beckett, Camus, Sartre, Duras, Robbe-Grillet and Pérec.

4 units, Spr (Mudimbe-Boyi)

198. Honors—Open to juniors and seniors with consent of adviser; 9-12 units total credit for completion of honors essay.

3-12 units (Staff)

199. Individual Work—Open only to majors in French with consent of department. Normally limited to 4-unit credit toward the major.

1-12 units (Staff)

ADVANCED UNDERGRADUATE AND GRADUATE

Note—Prerequisite for the following courses taught in French is one course from the 130 series or equivalent.
224. 17th-Century Novel—Major 17th-century novels: D’Urfé’s *L’Astrée*; Sorel’s *Histoire comiques de Francion*; Cyrano de Bergerac’s *Voyage dans la lune*; Furetière’s *Le Roman Bourgeois; Lettres portugaises*; Lafayette’s *La Princesse de Clèves*.

3-5 units, Win (Hullot-Kentor)

227. Elite and Popular Cultures from Louis XIV to the 1789 Revolution—Important events of cultural history from the end of the religious wars, to the Classical period of Louis XIV, and to the 1789 Revolution. The achievements of learned/elite and popular culture (celebration; writings and iconography). Slides.

4 units (Betrand) not given 1997-98

241. Symbolist Poetry: the Birth of Modernism—Five challenging and influential poets (Baudelaire, Nerval, Rimbaud, Mallarmé and Valéry) in relation to their individual poetic projects and to their collective creation of a “Symbolist” mode of poetic discourse, one in which form progressively takes over as the prime locus of “content.” Innovations in vers libre and prose poetry; complex negotiations between faith, disillusionment and illusion, music and letters, and modernity and the modern.

4 units, Aut (Landy)

251. Dieu Vivant—Comparative semiotic study of religious liturgies. Structural approaches to religious spaces, liturgical celebrations, and musical paradigms. (In French)

3-5 units, Spr (Mudimbe)

260. Methodology of Teaching French—Approaches, methods, and procedures in relation to foreign language acquisition theory applicable to the teaching and learning of French. Teaching practice regularly observed in demonstration class.

3-5 units, Spr (Hester)

261. Stylistics and Textual Analysis—In-depth textual analysis and commentary of excerpts from various genres. Different styles of criticism. The *exposé*, written and spoken. Designed to assure a high-level proficiency in written French. Prerequisite for undergraduates: 123. (WIM)

3-5 units, Win (Bertrand)

262. Pronunciation and Phonetics—Theory study and corrective work: articulation, intonation, rhythm, phonetic alphabet, etc.

3-5 units (Hester) not given 1997-98

279. Cultural History of 19th- and early 20th-Century France—Socio-political events and cultural activity from 1789-1799 to the artistic and ideological debates of the 1930s. Relationships between elite and popular culture are examined throughout. Thematic approach illustrated with slides.

3-5 units, Aut (Bertrand)

295A. La Fontaine: Five Fables—Five-week course.

2 units, Aut (Serres)

296A. Corneille, Tragédies Romaines—Five-week course.

2 units, Spr (Serres)

299. Individual Work—For students engaged in special work.

1-12 units, any quarter (Staff)

GRADUATE

359. Romanticism and Modernism—From the Romantic aesthetic and spiritual revolution of the 19th century to the Structuralist revolution of the 1960s, the ideas and works that have shaped an extremely fecund cultural period.

3-5 units, Spr (Bertrand)

399. Individual Work—For students in French working on special projects or engaged in presiddertation research.

1-12 units, any quarter (Staff)

ITALIAN SECTION

Note—Changes in course offerings are sometimes necessary after this bulletin has gone to print. Students are advised to consult the department bulletin board on a regular basis. Courses are taught in Italian unless noted.

Introductory Language Courses (1-99)

Advanced Language Courses (100-129)

Undergraduate courses in Literature and Culture (130-199)

Courses for Advanced Undergraduates and Graduates (200-299)

Graduate Seminars (300-399)

FIRST- AND SECOND-YEAR LANGUAGE

Note—Because the Italian Language Program does not have a formal placement test, students registering for the first time in a first- or second-year course must see the instructor for proper placement if they have had any prior training in Italian.

1. First-Year Italian (First Quarter)—Intensive introduction to the Italian language with emphasis on speaking and oral comprehension. Language lab.

5 units, Aut, Win, Spr (Staff)

2. First-Year Italian (Second Quarter)—Continuation of 1 with emphasis on the development of reading and writing skills, and on Italian culture. Language lab. Prerequisite: 1 or equivalent.

5 units, Aut, Win, Spr (Staff)

3. First-Year Italian (Third Quarter)—Continuation of 1 and 2 with additional cultural and literary readings. Language lab. Prerequisite: 1 or equivalent.

5 units, Aut, Win, Spr (Staff)

5. Accelerated First-Year Italian—Covers three quarters of Italian. Conversational drills and daily work in the language lab. All-in-Italian method develops basic skills in listening, speaking, writing.
and reading. Minimum enrollment required. Fulfills University language requirement.

10 units, Spr (Staff)

21. Second-Year Italian (First Quarter)—Comprehensive review of Italian grammar combined with further study of advanced grammar and Italian culture through literary texts. Prerequisite: 21 or equivalent.

3-4 units, Aut, Win (DeVine)

22. Second-Year Italian (Second Quarter)—Continuation of 21 with emphasis on translation, stylistics, and composition. Prerequisite: 21 or equivalent.

3-4 units, Win, Spr (DeVine, Napolitano)

23. Second-Year Italian (Third Quarter)—Continuation of 22. Prerequisite: 22 or equivalent.

3-4 units, Spr (Napolitano)

30. Conversation: Conoscere l'Italia—Advanced conversation for students planning to go to Florence and for those who have just come back from the study program in Italy. Students relive their Florentine experience and share it with the class. Films, slide shows, lectures on all aspects of Italian culture, including opera, modern music, wine, and food. Recommended to students with three quarters of Italian; two quarters may be sufficient. Prerequisite: consent of instructor.

3 units, Aut, Spr (Tempesta)

41A,B,C. Accelerated First-Year Italian—Covers one, two or three quarters of Italian. Conversational drills and daily work in the language lab. All-in-Italian method used, developing the four basic skills: listening, speaking, writing, and reading. No auditors.

9-12 units, Sum (Staff)

50. Reading Italian—Open to advanced undergraduates with consent of instructor; primarily for graduate students seeking to fulfill University foreign language requirements for advanced degrees. Accelerated course designed for acquisition of reading skills in Italian. No auditors.

3 units, Win (DeVine)

101. Language Specials—With consent of department only. See instructor for section number.

1-5 units (Staff)

114. Advanced Stylistics and Composition—Designed to achieve a high level of proficiency in written and spoken Italian. Readings of literary and non-literary texts with in-depth textual and grammatical analysis in class, oral reports, translations, and weekly writing assignments. Prerequisite: 22 or consent of instructor. (WIM)

3-4 units, Win (Napolitano)

115. Translation and Composition—Continuation of 114. Emphasis on composition, writing of short essays, and short stories. Prerequisite: 114 or consent of instructor.

3-4 units, Spr (Napolitano)

INTERMEDIATE-LEVEL LITERATURE

127. Italian Studies: Italian History—Italy through the centuries: what brought about the disintegration of the Roman Empire? Barbaric tribes traveled westward in northern Europe and descended all the way to Italy, while the Islamic world took a firm hold in the Mediterranean and exerted its influence on the life and the culture of southern Europe. As the temporal power faded, the secular power of the Church rose, and a new empire based on love and politics took hold of Italy. From St. Francis to the Renaissance, from the birth of a nation to the fascist takeover, travel through slides and videos. Prerequisite: 3 or equivalent. GER:3a (DR:7)

3-4 units, Aut (Napolitano)

128. Italian Studies: The Middle Ages and the Renaissance—Selected literary works from the Sicilian school, the Stilnovisti, Dante, Petrarch, Boccaccio, and Machiavelli. GER:3a (DR:7)

4 units, Win (Springer)

129. Italian Studies: Mannerism to the Modern—Selected works of Ariosto, Tasso, Galileo, Goldoni, Verga, and Pirandello. GER:3a (DR:7)

4 units, Spr (Springer)

130. Images of Italy through the Eyes of Foreigners—For students returning to the home campus after spending one or two quarters studying in Florence. With the approval and guidance of the director in Florence, a project was completed related to an aspect of Italian culture on documentation of city life (with live interviews), historical events, art history, social issues, fashion and design, contemporary and past literary figures, Italian television, etc. Students share their findings with Italian first- and second-year quarter students, and give a presentation in the department's cultural lecture series, if possible, in multimedia.

3 units, Aut (Napolitano)

190Q. Stanford Introductory Seminar: Popular Culture through the Ages—Preference to sophomores. In the 20th-century, popular culture was defined negatively as the culture (Gramsci) of the "subordinate classes." The rise and spread of popular culture in 16th-17th-century Europe, when the breaking of religious unity brought individuals new ideas and concepts via preaching or story telling; how concepts, fashions, and literary forms originated from the masses. How Italy, its fragmented political structure (city-states, Signorie), its emphasis on individual thinking, and varied and strongly divided social and linguistic regionalism, fostered the development of a diversified popular culture; parallels between popular culture's phenomena and now. Enrollment limited.

3 units, Win (Napolitano)
198. Honors—Open to juniors and seniors with consent of adviser; 9-12 units total credit for completion of honors essay.

3-12 units (Staff)

199. Individual Work—For students engaged in special work. See instructor for section number.

1-12 units (Staff)

ADVANCED LITERATURE

256. Negotiating Difference: North and South in Contemporary Italy—The phenomenon of regional difference in Italy from the 19th century to the present. Topics: the Risorgimento and the idea of national unity, historical perspectives on the "southern problem," cultural constructions of north and south, revisions of pastoral in the representations of the Mezzogiorn, the rhetoric of regionalism from the Sicilian separatist movement to the Lega Nord. Focus is on narrative fiction and film (Verga, Levi, Sciascia, Lampedusa, Visconti, Pasolini, Rosi).

4 units, Win (Springer)

299. Individual Work—For students engaged in special work. See instructor for section number.

1-12 units, any quarter (Staff)

GRADUATE

301. Graduate Workshop on Pedagogy—Introduction to the theory and practice of teaching Italian. Observations of demonstration classes taught by the master teacher and regular class visitations.

2 units, Spr (Napolitano)

399. Individual Work—For graduate students engaged in work on a special project in the field of Italian studies or predissertation research. May be repeated for credit. See instructor for section number.

1-12 units, any quarter (Staff)

AFFILIATED OFFERINGS

The following courses are accepted for credit in the major. See respective department listing for course descriptions, units, quarter, and General Education Requirements (GER) information.

CLASSICS

205A,B. The Semantics of Grammar (Devine)

LINGUISTICS

1. Introduction to Linguistics (Escure)

GERMAN STUDIES

Emeriti: (Professors) Walter F. W. Lohnes, Katharina Mommsen, Kurt Mueller-Vollmer; (Adjunct Professor) Gertrude Mahrholz
Chair: Russell A. Berman

Professors: Theodore M. Andersson, Russell A. Berman, Elizabeth Bernhardt, Gerald Gillespie, Orrin W. Robinson III
Assistant Professors: Karen J. Kenkel, Sara S. Poor, Arthur Strum
Senior Lecturers: William E. Petig, Kathryn Strachota, Brigitte Turneaure
Lecturers: Timothy Donahue-Bombosch, Glenn Kurtz, Henry Lowood
Acting Assistant Professor: John P. Heins

The department offers a variety of programs in German language and linguistics, literature, culture, and thought. Courses are open to majors and all interested students. Candidates are accepted for the degrees of Bachelor of Arts, Master of Arts, and Doctor of Philosophy.

By carefully planning their programs, students may fulfill the A.B. requirements for a double major in German Studies and another subject. An extended undergraduate major in English and German literature is available, as are coterminal programs for the A.B. and A.M. degrees in German Studies, and joint programs for the Ph.D. degree with Comparative Literature, Graduate Program in Humanities, Linguistics, and Modern Thought and Literature.

Special collections and facilities at Stanford offer possibilities for extensive research in German studies and related fields pertaining to Central Europe. Facilities include the Stanford University Libraries and the Hoover Institution on War, Revolution, and Peace. Special collections include the Hildebrand Collection (texts and early editions from the 16th to the 19th century), the Austrian Collection (with emphasis on source material of the time of Maria Theresa and Joseph II, the Napoleonic wars, and the Revolution of 1848), and the Stanford Collection of German, Austrian, and Swiss Culture. New collections emphasize culture and cultural politics in the former German Democratic Republic. The Hoover Institution has a unique collection of historical and political documents pertaining to Germany and Central Europe from 1870 to the present. The department also has its own reference library. Extensive use is made of the language lab in the Undergraduate Library as well as the department's own audio-visual equipment, films, tapes, and slides.

The Republic of Austria has endowed the Distinguished Visiting Professorship in Austrian Studies. The professorship rotates on a yearly basis through several departments.

Haus Mitteleuropa, the German theme house at 620 Mayfield, is an undergraduate residence devoted to developing an awareness of the culture of Central Europe. A number of department courses are regularly taught at the house, and there are in-house seminars and conversation courses. Assignment is made through the regular undergraduate housing draw.
The major in German Studies provides students with the linguistic and analytic facility to explore the significance of the rich cultural traditions and political histories of the German-speaking countries of Central Europe. At the same time, the interdisciplinary study of German culture, which can include art, literature, philosophy, history, political science, media theory, and other areas, also encourages students to evaluate broader and contradictory legacies of modernity. For example, the literary, artistic, and cultural responses to the belated and rapid modernization of Germany allow for reflection on the modern condition in general. Similarly, the German experience of national identity and political unification sheds light on wider issues of cultural cohesion and difference, as well as on the causes and meaning of phenomena such as racial prejudice, anti-Semitism, and the Holocaust. In general, an education in German Studies not only encourages the student to consider the profound effects of German-speaking thinkers and artists on the modern world, but also provides a lens through which the particular contours of the present and past can be evaluated.

Majors in German Studies formulate their plans in quarterly consultation with an undergraduate major adviser. Majors must demonstrate basic language skills, either by completing German 3 or the equivalent such as an appropriate course of study at the Stanford in Berlin Center. Students then enroll in intermediate and advanced courses on literature, culture, thought, and language. Requirements for the A.B. include at least three courses at the 130-139 level (introductory surveys on topics in German literature, thought, linguistics, and culture). Of these courses, every major is expected to complete at least one Writing in the Major course. Including German 1-3, the total requirement for the A.B. is a minimum of 60 units of work. With the approval of the adviser, appropriate courses offered by other departments can be accepted toward this total, up to a maximum of 25 units.

MINORS

There are two minor options.

German Language and Culture—Students may choose to minor in German Language and Culture if they are particularly interested in developing a strong ability in the German language, or in pursuing linguistic issues pertinent to German. Students satisfy the requirements for the minor in German Language and Culture by completing 35 units of course work, including at least three courses at the 100-129 level, taught in German. Study at the Stanford Center in Berlin for at least one quarter is highly recommended.

German Cultural Studies—Students who wish to study German literature, culture, or thought, without necessarily acquiring facility in the German language, may pursue a minor in German Cultural Studies. Students meet the requirements for the minor in German Cultural Studies by completing 35 units of course work in German literature, culture, and thought in translation, including at least three courses at the 130 or 140 level. (Five units of the CIV sequence Myth and Modernity may be counted towards the completion of requirements for the minor in German Cultural Studies).

STANFORD IN BERLIN

All undergraduates interested in Germany are urged to enroll in the Berlin program, which is open for academic study Autumn, Winter, and Spring Quarters. The program also offers internships in German industry, government, and cultural organizations year round. Through the center, students with at least two years of college-level German can also take courses at Freie Universität, Technische Universität, or Humboldt Universität. Most students live in homes with German hosts.

Most credits earned in Berlin can be applied to the undergraduate major in German Studies. All students who are planning to study at the Stanford Center in Berlin or engage in an internship are encouraged to consult with their major advisers and the Overseas Studies office about integrating work done abroad into their degree program. Returning interns who wish to develop a paper based on their experience should enroll in 298. More detailed information is available at the Overseas Studies Office in Sweet Hall or with the faculty adviser in the department.

INTERNSHIPS

Internships in Germany are arranged through the Overseas Studies program. In addition, students may consult with the department to arrange local internships involving German language use or issues pertaining to Germany or Central Europe. Interns who prepare papers based on their experience enroll in 298.

HONORS

Majors with a minimum grade point average (GPA) of ‘B’+ in German courses are eligible for departmental honors. In addition to requirements listed above, each honors candidate submits an essay representing 6 to 9 units of academic work. The essay topic is chosen in consultation with a faculty member of the department. Opportunities to commence research projects are offered at the Berlin Center.
EXTENDED MAJOR IN ENGLISH AND GERMAN LITERATURES

Students may enter this program with the consent of the chairs of both departments. See the “English” section of this bulletin.

MULTIPLE MAJORS

Students can combine a major in German Studies with a major in any other field. By carefully selecting courses in such disciplines as history, international relations, or economics, students can prepare themselves exceptionally well in the area of Central Europe. Multiple majors are especially recommended for students spending one or more quarters at the Stanford Center in Berlin.

COTERMINAL PROGRAMS

Students may elect to combine programs for the A.B. and A.M. degrees in German Studies. For details, see the “Undergraduate Degrees” section of this bulletin.

GRADUATE PROGRAMS

MASTER OF ARTS

This program is designed for those who do not intend to continue studies through the Ph.D. degree. Students desiring the A.M. degree must complete a minimum of 36 units of graduate work. If students enroll for three quarters for a minimum of 12 units per quarter, they can fulfill the A.M. requirements in one year. The program normally includes at least one course in each of the three areas of concentration: language and linguistics, literature, and thought.

In addition, students must take graduate-level courses in German and/or approved courses in related fields such as linguistics, comparative literature, philosophy, history, or art history.

A.M. candidates must take an oral examination toward the end of their last quarter.

DOCTOR OF PHILOSOPHY

The requirements for the Ph.D. include: (1) a minimum of 36 graduate units during the first year of graduate study and a minimum of 9 units per quarter during the six quarters following the first year; (2) a reading knowledge of one language other than English and German, normally French; (3) a master’s oral examination, unless the student already has an A.M. upon entering the program; (4) a qualifying paper; (5) a qualifying examination; (6) the University oral examination; and (7) a dissertation. Students in Medieval Studies must also have a reading knowledge of Latin.

The first year of work, which leads to the A.M. degree, is designed to introduce each student to the three major areas of study. During Spring Quarter of the first year, all students, except those admitted with a master’s degree, must take an oral A.M. examination. During the one-hour examination, the student is questioned by three examiners, chosen by the student, on work undertaken in specific graduate courses.

By July 1 of the summer following the first year of graduate study, students should present as a qualifying paper an example of their course work. Although ordinarily not meant to represent an original contribution to scholarship, it should demonstrate the candidate’s ability to grasp complex subject matter with sufficient competence to organize materials and to present arguments in a clear and concise manner commensurate with scholarly standards. The paper is submitted to the department chair, who passes it on for approval by the student’s faculty adviser and a second reader appointed by the chair in consultation with the adviser.

Students who enter the program with a master’s degree from another institution must submit, in lieu of a qualifying paper, a master’s thesis or a major research paper as evidence of ability to pursue advanced scholarly work.

At the end of the sixth quarter of study (and only if the qualifying paper has been accepted), the student takes a one-hour oral qualifying exam with two examiners, the student’s chosen adviser, and another faculty member appointed by the chair. The purpose of this examination is to demonstrate a broad familiarity with the literature of the major periods, movements, and some major figures. Only after successful completion of the qualifying procedure will the department approve the student’s admission to candidacy.

A student who fails the qualifying examination may retake it once at the beginning of the seventh quarter. The University oral examination in the Department of German Studies consists of an area examination; on consultation with the four prospective examiners, the student prepares a specialized list of relevant literature from an area of concentration, as well as appropriate secondary literature. The area of concentration is considerably broader than a dissertation topic but nevertheless allows for intensive work. Examples of areas of acceptable scope are: a 100-year period with some thematic emphasis, problems emerging from a particular genre in various contexts, a major literary movement, institutional setting, or discursive structure.

At least two weeks before the examination date, the student distributes the definitive version of the bibliography as well as a position paper, approximately 25 pages in length, addressing a major issue in the area of study. The examination consists of questions regarding this paper and the area of bibliography. The examination lasts at least two hours, permitting each of the four examiners a 20-minute question period and reserving an optional 10 minutes for questions from the chair of the examination.
terplays between traditional and modern cultures in German and are open to all students.

Students, regardless of their future fields of concentration, are expected to acquire excellence in German and thorough knowledge of the grammatical structure of German. The department expects Ph.D. candidates to demonstrate teaching proficiency in German; 200, Learning of German, is required. The teaching requirement is six quarters during the second and third years of study.

The department expects candidates to demonstrate research skills appropriate to their special areas of study. The requirement can be fulfilled in the capacity of either a University Fellow or a Research Assistant.

Graduate students are also advised to start developing skills in the teaching of literature by participating in the teaching of undergraduate literature courses. Students can earn up to 3 units of graduate credit for practice teaching in literature.

INTERDISCIPLINARY PROGRAMS

The department participates in the Graduate Program in Humanities leading to a joint Ph.D. degree in German Studies and Humanities. For a description of that program, see the “Humanities Special Programs” section of this bulletin.

Students may work toward a Ph.D. in German Studies with minors in such areas as comparative literature, modern thought and literature, linguistics, or history. Students obtaining a Ph.D. in such combinations may require additional training.

STANFORD TÜBINGEN GRADUATE EXCHANGE

One or two Stanford graduate students in German Studies may be accepted as exchange students by the University of Tübingen, and their counterparts from Tübingen participate in academic programs at Stanford.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

(AU) indicates that the course is subject to the University Activity Unit limitations (8 units maximum).

GENERAL

( IN ENGLISH)

These courses do not require a knowledge of German and are open to all students.

8A,9A. Myth and Modernity—Contrasts and interplays between traditional and modern cultures raise questions about history, progress, and change. What defines a cultural tradition? How do values change? When does a national past sustain or impinge on the present? These questions are referenced to German literary and philosophical writings, visual arts, films, and music. The impact of modernization on values, expressivity, and community. A critical perspective on cultures, via the ideas and values that contributed to the German legacy, with its proximity of intellectual achievement and political disaster. How does an obsession with “race” overtake Germany? Do all cultures require such myths or can mythic thinking be overcome? Readings/writers: Kant, Goethe, Rousseau, G. E. Lessing, Marx, Du Bois, Nietzsche, Freud, Kafka, Mann, Brecht, Arendt. One lecture plus four hours discussion section.

8A. Reason and Revolution—The Enlightenment legacy, stressing rationality, education, and progress, values which are central to the project of the University. The 19th-century afterlife of this Enlightenment legacy, from Romanticism to revolution, to Nietzsche’s critique of modern society. GER:1 (DR:1) (two-quarter sequence)

5 units, Win (Strum)

9A. Rationalization and the Return of Myth—Turns to modern Germany to inquire into the relationship between modernization and myth. Do new myths (of identity, community, race) arise in response to 20th-century rationalization and the discontent many feel with the Enlightenment legacy? Examines film, expressionist painting, political theater, the modernist novel, and literary and philosophical treatments of WWII and the Holocaust, to pose the question of individual identity and responsibility in the modern age. GER:1 (DR:1)

5 units, Spr (Berman)

20X. Meet the Mitt—(AU)

1 unit, Aut, Win, Spr (Staff)

38A. Introduction to the Germanic Languages—(Same as 138.) Survey of the oldest attested stages of the Germanic language family, including Gothic, Old Norse, Old Saxon, Old English, Old Frisian, Old Low Franconian (Old Dutch), and Old High German. The linguistic interrelationships, prehistory, Germanic tribal groupings, and written literature (if any). GER:3a (DR:7)

3 units, Spr (Robinson)

67A. Mass Culture, Cinema, and Nazi Germany—Mass culture in and about Nazi Germany, emphasizing the role of cinema. Topics: the depiction of the “masses” in films, the contrast between politicized propaganda culture and mass entertainment, and theories of mass culture. Nazi films are contrasted with the cinema of the Weimar Republic (Metropolis), anti-Nazi films from Hollywood (The
78Q. Stanford Introductory Dialogue: The Germans—Who are They?—Preference to sophomores. Identifies the Germans by examining historical roots of their attitudes, traditions, and political, cultural, and historical institutions. Burdens of the past and issues confronting the unified Germany.
2 units, Spr (Petig)

120N. Stanford Introductory Seminar: Nationality and the Discourse of Reason—Preference to freshmen. European Enlightenment can be described as an international movement aimed at constructing state and society in the image of reason; its participants saw themselves as the architects of this new order. The different concepts of enlightenment present in texts are examined from national traditions: German, French, Italian, “American,” etc. How did subsequent developments in European and world history (national revolutions; colonialism; communism; feminist, African-American, and other emancipation movements; the Holocaust) impact these different concepts? Works by Descartes, Hume, Rousseau, Diderot, Adam Smith, Kant, Schiller, etc. (In English) GER:3a (DR:7)
3 units, Aut (Strum)

125Q. Stanford Introductory Dialogue: The World of Epic—Preference to sophomores. Epics are ancient and well represented in many cultures. Students are routinely introduced to the western classics (Horner and Virgil) and often to the western medieval classics (Beowulf, Roland, Nibelungenlied, etc.), but the non-Western epic is largely relegated to the curriculum of specialized fields. To redress the balance, material includes two (peripheral) European epics, a few mainstream parodies, one modern epic, and a concentration on traditional non-European epics from the African, Japanese, Persian, and Turkic traditions.
2 units, Spr (Andersson)

162A. The Faust Legend in Literature and Film—Surveys major works dealing with Johann Faust, the 16th-century alchemist whose pact with the devil enabled him either to perform fantastic and magical feats, or to stretch the limits of scientific knowledge. The legend and manifestation in different contexts. The English Faust Book, Marlowe’s Dr. Faustus, Goethe’s Faust, Klaus Mann’s Mephisto, Alcott’s A Modern Mephistopheles, and Rice’s Tale of a Body Thief. Films: Murnau’s Faust (1929), Damn Yankees (1959), and Angel Heart (1987). GER:3a (DR: 7)
3-4 units, Spr (Poor)

168A. Hesse, Kafka, Mann—(Same as 268.) The three major prose writers of German modernism best-known internationally. Their differences and resemblances, artistic heritages, major themes, styles, and contributions to the age of “myth and psychology.” Readings: Buddenbrooks, Steppenwolf, The Trial, and Felix Krull. GER:3a (DR:7)
3-5 units, Aut (Gillespie)

175A. Modernization, Technology, and Culture in Germany, 1900 to 1945—(Same as 175/275.) Interactions of material life, technology, and culture in Germany 1900-45. Lectures, readings, films, and reports are organized around the identification and sorting out of modernist and anti-modernist, rational and anti-rational, technocratic and anti-technocratic strands; and technology as a source and artifact of social, political, and cultural movements. Topics: industrialization, urban development, new means of transportation and communication, literature and technology, film and technology, “Americanismus,” military technology, engineering culture of National Socialism.
4 units, Win (Lowood)

241A, 242A, 243A. The history of German thought 1750 to the present and its significance for an understanding of modern culture. Authors: Lessing, Herder, Kant, Schiller, Hegel, Marx, Nietzsche, Lukács, Husserl, Heidegger, Adorno, Habermas.

241A. Deutsche Geistesgeschichte I: 18th-Century German Thought—(Same as 241.) Introduction to 18th-century German thought, from Leibniz’ rationalist metaphysics to Kant’s sceptical-rationalist synthesis, with emphasis on the politics of theory. Discussions on the limits of reason, the vocation of the philosopher/intellectual, and the political and epistemological functions of art. (In English; readings in German or English)
3-5 units, Aut (Strum)

242A. Deutsche Geistesgeschichte II: 19th-Century German Thought—(Same as 242.) German thought in the 19th century: from the legitimation of philosophy and the philosopher after Kant’s critique of metaphysics (Fichte, Schelling, Hegel), to critiques of philosophy/the philosopher as ‘merely’ contemplative or historicist (Marx, Kierkegaard, Nietzsche). (In English; readings in German or English)
3-5 units, Win (Strum)

243A. Deutsche Geistesgeschichte III: 20th-Century German Thought—(Same as 243.) Movements in German thought in the 20th century through readings and rhetorical analysis of representative texts from Freud, Heidegger, Lukács, Adorno, Benjamin, Marcuse, Gadamer, Habermas, and Kittler. Schools such as psychoanalysis, hermeneutics, phenomenology, Critical Theory, and discourse analysis; issues such as technology, politics, and the dynamics of cultural reception.
3-5 units, Spr (Heins)

245A. Classicisms: Images of Antiquity in 18th- and 19th-Century Germany—(Same as 245.)

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Great Dictator, and with cinematic treatments of the Holocaust, e.g., Schindler’s List. The role of mass spectacle is referenced to the 1936 Olympics.
Conceptions of antiquity as expressions of dissatisfaction with contemporary culture and as imagined models of aesthetic and cultural excellence. Drama, poetry, novels, and essays by such writers as Winckelmann, Lessing, Wieland, Goethe, Schiller, Heine, and Nietzsche, and the visual arts (particularly architecture). (In English; readings in German or in English translation)

3-5 units, Spr (Heins)

296A. Literature of Decadence—(Same as 296/396) Symbolist, fin-de-siècle, and modernist understandings of the evolution of civilization; the themes of intellectual and spiritual crisis, the "decline of the West," and "art for art's sake" in European poetry, drama, and fiction 1880-1930; the impact of Decadence on modern art and thought (Impressionism, Jugendstil, neo-Rosicrucianism, Cubism, Futurism, Art Nouveau, Expressionism, etc.; Wagner, Nietzsche, Bergson, Freud as symptomatic figures).

3-12 units, Aut (Strachota)

HAUS MITTELEUROPA

20A. Beginning Conversation—(AU)
1 unit, Aut, Win, Spr (Staff)

20B. Intermediate Conversation—(AU)
1 unit, Aut, Win, Spr (Staff)

20C. Advanced Conversation—(AU)
1 unit, Aut, Win, Spr (Staff)

20D. Beginning Conversational Danish—(AU)
1 unit, Aut (Staff)

20E. History of German Science—(AU)
1 unit, Spr (Staff)

20H. Germany in the Second World War—A history survey. (AU)
1 unit, Win (Staff)

20K. Küche Mitt (German Cooking Class)—(AU)
1 unit, Aut (Staff)

20M. Filmkunst aus Mitteleuropa—(AU)
1 unit, Aut, Win, Spr (Staff)

20N. German Music—(AU)
1 unit, Aut, Win (Staff)

20T. Teaching German Conversation—(AU)
1 unit, Aut, Win, Spr (Staff)

20U. Germany since Unification—(AU)
1 unit, Spr (Staff)

Other in-house courses may be announced.

INTERMEDIATE

At this level, students have several options depending on their interests. After completing German 3 or the equivalent, students may enroll directly in courses on the 120-level, which consider special topics in German culture while encouraging additional language learning. Alternatively, 21 and 22 emphasize a systematic review of the language, while 21W and 22W study the language of business and economics.
21. Intermediate German I—Review of grammatical structures, vocabulary building, and listening comprehension. Introduction to Landeskunde through readings and discussions of short expository and fictional texts. Weekly readings from the online German language press. Frequent short writing assignments.

3-4 units, Aut, Win, Spr (Turneauere)

21W. Intermediate German I: Business German—Equivalent to 21, but readings, discussion, and exercises focus on the business world. Audio-tapes and videos. Recommended for students planning to do a business internship in Germany. Prerequisite: 3.

3 units, Win, Spr (Petig)

22. Intermediate German II—Continuation of 21, with greater emphasis on reading and writing skills. Literary texts of major 20th-century writers in their historical context and on-line articles from the German language press.

4 units, Win, Spr (Turneauere)

22W. Intermediate German II: Business German—Equivalent to 22, but continues the business focus of 21W. Recommended for students going to Germany to do an internship. Prerequisite: 21 or 21W.

4 units, Spr (Petig)

100. Advanced Listening and Speaking Skills—Designed to increase fluency and precision in speaking and to improve listening comprehension. Audio and video tapes, fictional and expository texts, vocabulary building exercises.

3 units (Strachota) not given 1997-98

105. Advanced Business German—Case studies of typical business situations in German with accompanying videos, listening comprehension exercises, and computer drills. Business correspondence and reports in German. Prepares students for the International Business German exams.

3-4 units, not given 1997-98

110. German Newspapers—Articles from the weekly Die Zeit and on-line dailies and news magazines read and discussed. Short written commentaries. Systematic vocabulary building.

3-4 units, Aut (Turneauere)

Win (Strachota)

111. Television News from Germany—Viewing of German TV broadcasts and feature films. Introduction to current issues in Germany. Emphasis on building listening comprehension.

2 units, Win (Strachota)

121. Pop Culture in Contemporary Germany—Current trends in German popular culture. Reading material is magazines and newspapers, and contemporary short stories and detective novels. German television’s home-made soap operas, detective and talk shows; recent developments in German popular music. Oral reports on the materials. Prerequisite: 3 or equivalent. (In German) GER:3a (DR:7)

4 units, Aut (Poor)

122B. The American West in the German Imagination—Images of the American West in the various forms of German cultural and political thought from the early 19th century to the present. Materials; Western novels (e.g., Charles Sealsfield’s Texas novels and Karl May’s Western adventures); landscape painting (e.g., Rocky Mountain panoramas of the German born and trained Albert Bierstadt); and films (e.g., Wim Wenders’ Paris, Texas and Harald Reinl films from the 60s). Focus is on conceptions of space and the conflict of “races.” (In German) Prerequisite: 3 or equivalent. GER:3a (DR:7)

4 units, Win (Heins)

123N. The Brothers Grimm and their Fairy Tales—Preference to freshmen. A historical, biographical, linguistic, and literary look at the famous Kinder- und Hausmärchen of Jacob and Wilhelm Grimm. Readings from the fairy tales. Materials in other media (film and the visual arts) are introduced. Small-group performances of dramatized fairy tales. Prerequisite: 3 or equivalent. (In German) GER:3a (DR:7)

4 units, Spr (Robinson)

124. Reading German Poetry in the Original—Sophomore workshop on selected poems from various periods of German literature. Parsing sentences, analysis of levels of vocabulary, evaluation of sound structures, imagery, figures, and themes, and translation as a technique of acquisition and appreciation. The technical terms for describing metrical verse, and generic forms in German and English. Prerequisite: completion of one year of college-level German or consent of instructor. GER:3a (DR:7)

3-5 units, Win (Gillespie)

131-133. German literature and culture from the 18th century to present. Topics vary each year and courses may be repeated with consent of the instructor. (Readings in German)

131. 18th-Century Literature and Culture: Modernity and the Crisis of Self—The effects of the crisis of traditional authority on the concept and substance of the self, as seen through literature, philosophy, painting, and music. The project of enlightenment, the concept of modernity, romantic subjectivity, constructions of race and gender, and post-conventional identity. Works by Goethe, Lessing, Kant, Fichte, Wackenroder, Tieck, Novalis, Hegel, Beethoven, Caspar David Friedrich. GER: 3a (DR:7)

4 units, Aut (Heins)

132. 19th-Century Literature and Culture: Romanticism in German Culture, 1798-1848—Organic metaphors, romantic irony, conceptions of the nature of art, and reactions
to romanticism in German writing from the first half of the 19th century. Literary readings from Schlegel, Novalis, Tieck, Eichendorff, Hoffmann, Goethe, and Heine complemented by the visual arts, political writings, and short philosophical texts. GER:3a (DR:7) (WIM)

4 units, Win (Heins)

133. 20th-Century Literature and Culture: German Expressionism—The Subject in Crisis—Expressionist painting, drama, poetry, and film through WW I. Thematization of the metropolis, violence, utopia, revolution, and death as elements of subjective protest or assertion. Plays and poems by Goering, Hasenclever, Kaiser, Heym, Becher, Ball Juenger; paintings by Nolde, Kandinsky, Kokoschka, Beckmann; and films such as The Cabinet of Dr. Caligari, The Golem.
not given 1997-98

134P. Medieval Women—The place, participation, and images of women in medieval culture, emphasizing German-speaking contexts. Prominent historical women (e.g., Empress Matilda), images of women in medieval poetry (Minnesang), romance (Hartmann von Aue's Erec) and drama (Hans Sachs), and texts authored by women (letters and autobiographical writings of women mystics). Primary texts in German, some secondary material in English. Discussion in German and English. GER:3a,4c (DR:7)

4 units, Spr (Poor)

138. Introduction to Germanic Languages—(Same as 38A.) GER:3a (DR:7)

3 units, Aut (Bernhardt)

161B. Medieval Courtly Romance—(Same as 231.) What is medieval about these texts? What is courtly love? Courtliness? Romance? Traditional opposition between oral and written culture is reexamined in light of theories of performance, especially of gender and class, and of text. Readings: Chrétien's Yvain and Lancelot (in English), Knight of the Cart; Hartmann's Iwein, Gottfried's Tristan, and der Stricker's Daniel von dem blühenden Tal. Primary texts in modern German, secondary readings in German and English. GER:3a (DR:7)

1 unit, Aut, Win, Spr (Staff)

194. German Studies Colloquia—Stanford faculty, students, and visiting scholars present and discuss their work in German Studies and related fields. Bi-monthly meetings.

1 unit, Aut, Win, Spr (Staff)

199. Individual Reading—36 hours of reading per unit, weekly conference with instructor. May be repeated for credit. Prerequisite: consent of instructor.

1-2 units, Aut, Win, Spr (Staff)

ADVANCED UNDERGRADUATE AND GRADUATE

201. The Learning and Teaching of Second Languages—Approaches the teaching of second languages from a learning perspective, eschewing the traditional sense of "teaching methods." Focuses on instructional decision-making within the context of students' intellectual and linguistic development, and prepares language instructors to teach languages in a variety of university settings to an array of populations. Some general reading in second language acquisition (SLA) and language-specific reading within the database in SLA.

3-5 units, Aut (Bernhardt)

203. History of the German Language—The historical background of the modern German lan-
guage. Emphasis is on the explanation of certain phonological, morphological, and syntactic peculiarities in the modern language by reference to earlier stages of the language, from Proto-Indo-European to the immediate past. Introduction to the principles of historical linguistics.

3-5 units, Win (Robinson)

231-239. German Literature and Culture—(Same as 331-339.) The major periods of German literature from the early Middle Ages to the present. Undergraduate prerequisite: consent of instructor.

231. Medieval Courtly Romance—(Same as 161B.) GER:3a (DR:7)

3-5 units, Aut (Poor)

232B. German Literature and Culture: Early Modern—(Same as 332B.) Introduction to New High German literature from the waning of the Middle Ages through the Renaissance and Reformation period (circa 1350-1600). 15th- and 16th-century poetry, drama, fiction, and discursive prose: readings from Latin poems by German authors, in translation, and crucial texts in the development of religious and scientific thought. Emphasis is on the "Bakhtinian" manifold of popular, regional, and international heritages shaping German culture.

3-5 units, Win (Gillespie)

233. The Early Humoristic Novel—(Same as 333.) The evolution of form, subject matter, and terminology in the romance and novel of the Renaissance and Baroque era; the rise of the humoristic-encyclopedic tradition in relation to humanist satire, bourgeois themes, and the picaresque, quester, and adventure modes. Principal readings: Rabelais' Gargantua and Pantagruel, Cervantes' Don Quixote, Grimmelshausen's Simplicissimus.

3-5 units, Spr (Gillespie)

241-243. The history of German thought from 1750 to the present and its significance for an understanding of modern culture. Authors: Lessing, Herder, Kant, Schiller, Hegel, Marx, Nietzsche, Lukács, Husserl, Heidegger, Adorno, Habermas. (In English)

241. Deutsche Geistesgeschichte I: 18th-Century German Thought—(Same as 241A.)

3-5 units, Aut (Strum)

242. Deutsche Geistesgeschichte II: 19th-Century German Thought—(Same as 242A.)

3-5 units, Win (Strum)

243. Deutsche Geistesgeschichte III: 20th-Century German Thought—(Same as 243A.)

3-5 units, Spr (Heins)

245. Classicisms: Images of Antiquity in 18th- and 19th-Century Germany—(Same as 245A.)

3-5 units, Spr (Heins)

257. Gothic—Introduction to the grammar and texts of this earliest extensively-documented Germanic language, a relative of the German and the English languages. Issues surrounding the Germanic proto-language.

3-5 units, Win (Robinson)

268. Hesse, Kafka, Mann—(Same as 168A.) GER:3a (DR:7)

3-5 units, Aut (Gillespie)

272M. Digital Media and the Modernist Legacy—(Same as 172M.)

3-5 units, Spr (Kurtz)

275. Modernization, Technology, and Culture in Germany, 1900 to 1945—(Same as 175/175A.)

4 units, Win (Lowood)

277. Faust—Goethe's Faust, with classical and contemporary criticism. Readings/discussion primarily in German.

3-5 units, Aut (Berman)

285. Kleist's Dramas: Constructions of Nationhood and Gender—(Same as 185.)

3-5 units, Win (Schell)

296. Literature of Decadence—(Same as 296A/296.)

3-5 units, Spr (Gillespie)

298. Individual Work—Open only to German majors and to students working on special projects, including written reports for internships. Honors students use this number for the honors essay. May be repeated for credit.

1-15 units each quarter (Staff)

332B. German Literature and Culture: Early Modern—(Same as 232B.)

3-5 units, Win (Gillespie)

333. The Early Humoristic Novel—(Same as 233.)

3-5 units, Spr (Gillespie)

297. Literature of Decadence—(Same as 296A/296.)

3-5 units, Spr (Gillespie)

ADVANCED GRADUATE

400. Dissertation Research—Exclusively for graduate students in German working on dissertations.

1-12 units, Aut, Win, Spr, Sum (Staff)

OVERSEAS STUDIES

These courses are approved for the German major and taught at the campus indicated. Students should discuss with their major advisers which courses would best meet educational needs. Course descriptions can be found in the "Overseas Studies" section of this bulletin or in the Overseas Studies Program office, 126 Sweet Hall.

BERLIN

166B. Women, Literature, and Political Change

4 units, Aut (Hörnigk)
HISTORY 501

177A. Culture and Politics in Modern Germany
4-5 units, Win (Kramer)

177B. Nationalism and Political Culture in Contemporary Germany
4 units, Spr (Tempel)

179B. German Film and its European Context
4 units, Spr (Kramer)

AFFILIATED DEPARTMENTS

HISTORY

37S. Sources and Methods Seminar: Whores, Nymphs, and Charming ‘Tough Guys’-Images of Male and Female Identity in Interwar Europe
5 units, Win (Bruns)

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The Department of History offers courses of general cultural and educational value. It seeks not only to provide knowledge in special historical fields but also to equip the student for duties as a citizen and to give instruction which will aid in law; journalism, library work; local, state, and national public service; and business.


Chair: Norman Naimark


Associate Professors: Philippe Buc (on leave), Gordon H. Chang, Paula Findlen, Kennell A. Jackson Jr., Mary L. Roberts

Assistant Professors: Brad S. Gregory, Gabrielle Hecht (on leave), Ellen G. Neskar, Karen Sawislak, Michael Thompson, Amir Weiner

Courtesy Professors: Paul David, Susan M. Treggiari, Gavin Wright

Courtesy Associate Professor: Avner Greif

Senior Lecturer: Joseph J. Corn (on leave)

Modern Europe Lecturers: Robert Batchelor, Stephen Hastings-King, P. Isaac Miller, Christopher Schmidt-Nowara, Jennifer Selwyn

Lecturers: Todd Benson, Margo Horn, Laurie Koloski, Noel Maurer

Acting Assistant Professor: Kathryn Miller

Visiting Professor: Conrad Totman
Visiting Assistant Professors: Susan Cahn, Roger Hart

The program for the undergraduate major emphasizes both breadth of training and concentration of studies in a selected field of history.

Each candidate for the A.B. in History should: (1) declare a major in the Spring Quarter of the second year or the Autumn Quarter of the third year of study; (2) be enrolled, if possible, in the department for at least six quarters, counting the first quarter of registration.

As foundation requirements, candidates must (1) complete twelve courses in History and receive a grade point average (GPA) of 'C' or higher; (2) complete four small group courses including one sources and methods seminar, two colloquia, and one senior research seminar, preferably in the field of concentration.

Because capacity to write with ease and lucidity is an important skill, each major is required to do a substantial amount of writing. Eight of the courses used to complete the major must include paper-writing assignments of eight pages or more. Further, at some point, each major must fulfill the Major Paper requirement, which involves completing a substantial essay of at least 20 pages. This requirement may be fulfilled in any of several ways: (1) by completing a senior thesis or an undergraduate research seminar; (2) by designating any 100- or 200-level course in the department as the forum within which the paper will be written; or (3) by developing and expanding a paper written for any History course the student has previously taken (other than History 1-2-3 or sources and methods seminars taught by graduate students). Students choosing options 2 or 3 may enroll in History 200X for 1-2 additional units, under the supervision of a member of the faculty. Fulfillment of the departmental Major Paper requirement also satisfies the University Writing in the Major Requirement.

A minimum of six courses must be taken from members of the Department of History. Directed reading resulting in a substantial amount of writing is awarded a letter grade; other directed reading courses, unless used in conjunction with the honors program or with an undergraduate
research seminar, are given only for Satisfactory/No Credit and do not count toward the fulfillment of major requirements.

To ensure chronological and geographical breadth, at least two courses must be completed in a "premodern" chronological period and in each of three geographical fields: Field I (Africa, Asia, and Middle East); Field II (the Americas); Field III (Europe, including Western Europe, Eastern Europe, and Russia). Courses fulfilling the "premodern" chronological period may also count for fields I-III.

To develop some measure of expertise, students must complete four courses in one of the following fields of concentration: Africa, Asia, Eastern Europe and Russia, Europe before 1700, Europe since 1700, Jewish History, Latin America, Science and Technology, the United States, the Middle East, or a thematic subject treated comparatively, such as war and revolution, work, gender, family history, popular culture/high culture, and so on. The proposed concentration must be approved by the major adviser; a proposal for a thematic concentration must have the approval of both the adviser and the department's Committee on Undergraduate Studies. At least one and preferably two of these four courses should be an undergraduate colloquium or research seminar.

The department also encourages students to think seriously about pursuing plans of study that involve acquisition of foreign languages and/or study at one of our overseas campuses. Such studies are not only valuable in themselves, they can also provide an opportunity for independent research and a foundation for senior theses.

History majors are required to complete an sources and methods seminar, other small group courses, and a concentration; completion of the major requires planning. Following consultation with their adviser, majors must file an approved plan of study with the department's undergraduate assistant.

MINORS

Candidates for the minor in History must complete six courses, at least three of which must have a field or thematic focus. The department ordinarily defines fields in terms of geography or chronology, but it also invites students to pursue thematic topics that can be examined in broadly comparative terms. Students completing the minor may choose to concentrate in such fields as African, American, British, East Asian, European (medieval, early modern, or modern), Russian and East European history, or some thematic topics as the history of gender, the family, religion, technology, or revolution. Students may also petition to have a concentration of their own design count toward the minor.

Two of the six courses must be small-group in format, drawn from department offerings of sources and methods seminars, colloquia, and undergraduate research seminars. History courses taken at overseas campuses may count toward the minor, but at least three of the six courses must be taken from Stanford faculty. Five units from History 1, 2, 3 (Area 1) may be counted toward the six-course requirement, but not for the field concentration.

Students must declare the minor in History no later than the Autumn Quarter of the senior year. They are assigned a faculty adviser, who must approve a plan of study to be filed with the department.

HONORS PROGRAM

For a limited number of majors, the department offers a special program leading to honors in History. Students accepted for this program, in addition to fulfilling the general requirements stated above, begin work on an essay in Spring Quarter of the junior year and complete the essay by mid-May of the senior year. Students normally take 12 to 15 units of honors work, excluding the colloquium, to be distributed as best fits their program.

To enter this program, the student must be accepted by a member of the department who agrees to advise on the research and writing of the essay, and must enroll in the Spring Quarter honors seminar. An exception to the latter requirement may be made for those studying overseas Spring Quarter of the junior year, but such students should consult with the director of the honors program, if possible, prior to going overseas. Under exceptional circumstances, students are admitted to the program in the Autumn Quarter of the senior year.

In considering an applicant for such a project, the adviser and director of the honors program take into account general preparation in the field of the project and expect an grade of at least 'B+' in the student's previous work in history and in the University. Students satisfactorily completing the program are eligible for honors in History, depending upon the quality of their work. To enter the honors program, apply at the Department of History office.

James Birdsall Weter prizes are awarded each year for the outstanding honors essays.

SECONDARY (HISTORY) TEACHER'S CREDENTIAL

Applicants for the Single Subject Teaching Credential (Secondary) in the social studies may obtain information regarding the requirements by applying to the Credential Administrator, School of Education.
COTERMINAL A.B. AND A.M. PROGRAM

The department each year admits a limited number of undergraduates to work for coterminous A.B. and A.M. degrees in History. Applications for admission should be submitted by January 31 of the senior year. Applicants must meet the same general standards as those seeking admission to the A.M. program; they must submit a written statement of purpose, a transcript, and three letters of recommendation, at least two of which should be from members of the Department of History faculty. The decision on admission rests with the Graduate Admissions Committee. Students must meet all requirements for both degrees. They must complete 15 full-time quarters (or the equivalent), or three full-time quarters after completing 180 units, for a total of 216 units. During the senior year they may, with the consent of the instructors, register for as many as two graduate courses. In the final year of study, they must complete at least three courses that fall within a single Ph.D. field.

GRADUATE PROGRAMS

ADMISSION

Applicants for admission to graduate work must take the General Test of the Graduate Record Examination. It may be taken at most American colleges and in nearly all foreign countries. For details see the Guide to Graduate Admission, available from Graduate Admissions, the Registrar’s Office.

Students admitted to graduate standing do not automatically become candidates for a graduate degree. With the exception of students in the terminal A.M. program, they are admitted with the expectation that they will be working toward the Ph.D. degree, and may become candidates to receive the A.M. degree after completing three quarters of work.

MASTER OF ARTS

The department requires the completion of nine courses (totaling not less than 36 units) of graduate work; seven courses of this work must be Department of History courses. Of the seven, one must be a seminar and three must be either graduate colloquia or graduate seminars. Directed reading may be counted for a maximum of 10 units. A candidate whose undergraduate training in history is deemed inadequate must complete nine courses of graduate work in the department. The department does not recognize for credit toward the A.M. degree any work that has not received the grade of ‘A,’ ‘B,’ or ‘+.’

TERMINAL A.M. PROGRAM

Applicants who do not wish to continue beyond the A.M. degree are admitted to this program at the discretion of the faculty in individual fields (U.S., modern Europe, and so on). Students admitted may not apply to enter the Ph.D. program in History during the course of work for the A.M. degree.

A.M. IN TEACHING (HISTORY)

The department cooperates with the School of Education in offering the Master of Arts in Teaching degree. For the general requirements, see the “School of Education” section of this bulletin. For certain additional requirements made by the Department of History, contact the department office. Candidates must possess a teaching credential or relevant teaching experience.

DOCTOR OF PHILOSOPHY

Students planning to work for the doctorate in history should be familiar with the general degree requirements of the University outlined in the “Graduate Degrees” section of this bulletin. Those interested in applying for admission to the A.M. and Ph.D. programs should contact Graduate Admissions, the Registrar’s Office, Old Union, in order to receive an application. Applications become available in September of the year prior to intended enrollment. The application filing deadline is January 1. Applicants must file a report of their general scores on the Graduate Record Examination and submit a writing sample of 10-25 pages on a historical topic. Successful applicants for the A.M. and Ph.D. programs may enter only in Autumn Quarter.

Upon enrollment in the graduate program in History, the student has a member of the department designated as an adviser with whom to plan the Ph.D. program. Much of the first two years of graduate study is spent taking courses, and, from the outset, the student should be aware that the ultimate objective is not merely the completion of courses but preparation for general examinations and for writing a dissertation.

Admission to the Department of History in the graduate division does not establish any rights respecting candidacy for an advanced degree. At the end of the first year of graduate study, students are evaluated by the faculty and given a progress report. A final decision as to whether she or he will be allowed to continue to work towards the Ph.D. is made in the Winter Quarter of the student’s second year.

After the completion of certain further requirements, students must apply for acceptance for candidacy for the doctorate in the graduate division of the University.

REQUIREMENTS

1. In consultation with the adviser, students select an area of study from the list below in which to concentrate their study and later take the
University oral examination. The major concentrations are:
Europe, 300-1400
Europe, 1400-1789
Europe since 1700
Jewish History
Russia
Eastern Europe
Middle East
East Asia before 1600
East Asia since 1600
Africa
Britain and the British Empire since 1460
Latin America
The United States (including Colonial America)
History of Science and Technology

2. The department seeks to provide a core colloquium in every major concentration in which students normally enroll during the first year of graduate study.

3. Students are required to take two research seminars, at least one in the major concentration. Normally, research seminars are taken in the second year.

4. Each student, in consultation with the adviser, defines a secondary concentration. This concentration should represent a total of four graduate courses or their equivalents, and it may be fulfilled by working in a historical concentration or an interdisciplinary concentration. The historical concentrations include:
   a) One of the concentrations listed above (other than the student's major concentration).
   b) One of the concentrations listed below, which falls largely outside the student's major concentration:
      The Ancient Greek World
      The Roman World
      Europe, 1000-1400
      Europe, 1400-1600
      Europe, 1600-1789
      Europe, 1700-1871
      Europe since 1848
      England, 450-1460
      Britain and the British Empire, 1460-1714
      Britain and the British Empire since 1714
      Russia to 1800
      Russia since 1800
      Eastern Europe to 1800
      Eastern Europe since 1800
      Jewish History
      Middle East to 1800
      Middle East since 1800
      Africa
      China before 1600
      China since 1600
      Japan before 1600
      Japan since 1600

   c) Work in a national history of sufficiently long time to span chronologically two or more major concentrations. For example, a student with Europe since 1700 as a major concentration may take France from about 1000 to the present as a secondary concentration.

   d) A comparative study of a substantial subject across countries or periods. The secondary concentration requirement may also be satisfied in an interdisciplinary concentration. Students plan these concentrations in consultation with their advisers. Interdisciplinary concentrations require course work outside the Department of History, which is related to the student's training as a historian. Interdisciplinary course work can either add to a student's technical competence or broaden his or her approach to the problems of the research concentration.

5. Each student, before conferral of the Ph.D., is required to satisfy the department's teaching requirement.

6. There is no University or department foreign language requirement for the Ph.D. degree. A reading knowledge of one or more foreign languages is required in concentrations where appropriate. The faculty in the major concentration prescribes the necessary languages. In no concentration is a student required to take examinations in more than two foreign languages. Certification of competence in commonly taught languages (that is, German, French, Spanish, Portuguese, Russian, and Latin) for candidates seeking to fulfill the language requirement in this fashion is done by the appropriate language department of the University. Certification of competence in other languages is determined in a manner decided on by faculty in the major concentration. In either case, certification of language competence must be accomplished before a student takes the University oral examination.

7. The student is expected to take the University oral examination in the major concentration early in the third graduate year.

8. The student must complete and submit a dissertation which is the result of independent work and is a contribution to knowledge. It should evidence the command of approved techniques of research, ability to organize findings, and competence in expression. For details and procedural information, inquire in the department.
RESOURCES

The rich, and in some respects unique, collection of the Hoover Institution on the causes, conduct, and results of WW I and WW II are being augmented for the post-1945 period. The materials include government documents, newspaper and serial files, and organization and party publications (especially British and German Socialist parties). There are also important manuscript collections, including unpublished records of the Paris Peace Conference of 1919 and the Herbert Hoover archives, which contain the records of the Commission for Relief in Belgium; the American Relief Administration; the various technical commissions established at the close of WW I for reconstruction in Central and Eastern Europe; the personal papers of Herbert Hoover as United States Food Administrator; and other important personal papers. Other materials for the period since 1914 relate to revolutions and political ideologies of international importance; colonial and minority problems; propaganda and public opinion; military occupation; peace plans and movements; international relations; international organization and administration including the publications of the United Nations, as well as principal international conferences. The Hoover Institution also possesses some of the richest collections available anywhere on the British labor movement; Eastern Europe including the Soviet Union; East Asia (runs of important newspapers and serials and extensive documentary collections, especially for the period of WW II); and Africa since 1860, especially French-speaking Africa, the former British colonies, and South Africa.

The University Library maintains strong general collections in almost all fields of history. It has a very large microtext collection, including, for instance, all items listed in Charles Evans’ American Bibliography, and in the Short-Title Catalogues of English publications, 1474-1700, and virtually complete microfilmed documents of the Department of State to 1906. It also has a number of valuable special collections including the Borel Collection on the History of California; many rare items on early American and early modern European history; the Brasch Collection on Sir Isaac Newton and scientific thought during his time, and other such materials.

FINANCIAL SUPPORT

Students who are admitted with financial support are provided four years of support through fellowship, teaching and research assistantships, and tuition grants. Applicants who have completed the A.M. degree from another institution may be eligible for three years of support. Applicants should indicate on the admissions application whether they wish to be considered for such support. No separate application for financial aid is required.

U.S. citizens and permanent residents who are interested in area language studies in East Asia, Latin America, Africa, and the republics of the former Soviet Union may request a Foreign Language and Area Studies (FLAS) fellowship application from:

FLAS Coordinator
(650) 723-0564
FLAS application deadline: mid-January

COURSES

See the Time Schedule for changes in course offerings each quarter, and check the web at http://www-portfolio.stanford.edu:6380/430 for updated information.

INTRODUCTORY UNDERGRADUATE AREA ONE PROGRAM

1,2,3. Europe: From Antiquity to the Present—This sequence fulfills the Area 1 requirement. It explores the relationship between cultural, political, social, and economic developments in Europe and America since Antiquity. Emphasis is on the growth of European and American cultures from sources and influences within and outside Europe. Topics: Judeo-Christian heritage, the emergence of classical cultures, their influence on the Middle Ages and the Renaissance, social and religious upheavals of the Reformation, consolidation of the European state system, innovations emerging with modern industrial society, and global consequences of European and American developments. Meets three hours weekly with lecturers from the regular History faculty and two hours a week for colloquia in small groups led by postdoctoral fellows. Enrollment limited; students intending to apply the sequence toward their Area 1 requirement are given priority.
1. Europe: Late Antiquity to 1500—Themes of group identity, power, and religion, surveying the transformations of European society and power-structures from Augustus to Machiavelli. How did groups fashion and refashion themselves through contact with other groups, the pressures of politics, and the utilization of sacred norms? How did religions influence societies and how were religions transformed by societies? GER:1 (DR:1) (three-quarter sequence)

5 units, Aut (Morris)

2. Europe and Beyond, 1500-1789—Survey of the intellectual and social currents from the voyages of Columbus to the American Revolution. Readings: Shakespeare, Locke, Wollstonecraft, Rousseau, and Jefferson. GER:1 (DR:1) (three-quarter sequence)

5 units, Win (Chappell)

3. Europe and Beyond: The Modern Age, 1789 to the Present—European and American history since 1789 has been a persistent attempt to come to terms with the promise and perils of the great revolutions of the 18th century. Emphasis is on the divergent paths of European and American democracies set against a variety of political, social, and ideological movements. GER:1 (DR:1) (three-quarter sequence)

5 units, Spr (M. L. Roberts)

STANFORD INTRODUCTORY SEMINARS

Refer to the Time Schedule or contact the Stanford Introductory Studies office (123 Sweet Hall, telephone 650-723-4504) for applications and information.


3 units, Win (Findlen)

16N. Stanford Introductory Seminar: Science on Trial—The Crimes of Galileo—Preference to freshmen. In different periods scientific knowledge has been contested by competing authorities with a claim to possess another truth. How do scientists respond to such assaults? How do we view these debates over time? The 1633 trial of the Italian mathematician Galileo is a point of departure to explore the relations between science, politics, faith, and reason. Students compare this episode with other scientific controversies in the past and the present. GER:3a (DR:7)

5 units, Spr (Findlen)

20Q. Stanford Introductory Seminar: Cultural Revolution in 18th-Century Russia—(Formerly 204K.) Preference to sophomores. The legacy of Peter the Great (1682-1725). Did he really transform Russia, as he is said to have done? If so, in what ways? Social and cultural change in the wake of Peter's dynamic rule, whether the Europeanization in 18th-century culture was more than skin-deep. Continuity and change in the rhetoric of power, mores and manners, aristocratic life, printing and literacy, opportunities for women, and social mobility.

3.5 units (Kollmann) given 1998-99

22N. Stanford Introductory Seminar: Ethnic Cleansing in 20th-Century Europe—Preference to freshmen. The major episodes of "ethnic cleansing" in 20th-century Europe: the Greek expulsion from the Ottoman Empire/Turkey and the Armenian genocide, Nazi genocidal policies, the expulsion of Germans from Poland and Bohemia, the deportation of the Crimean Tatars, and the case of Bosnia. GER:3a (DR:7)

5 units, Win (Naimark)

27N. Stanford Introductory Seminar: The First World War as Experience and Memory—Preference to freshmen. What the war meant to European and American soldiers and civilians as they lived through it and remembered it. Readings: diaries, novels, poems, and historical works. GER:3a (DR:7)

3 units, Win (Sheehan)

34Q. Stanford Introductory Seminar: Virtuality—(Formerly 204I.) Preference to sophomores. New media technology from the printing press and photography to computer-mediated communication has transformed our experience of the "real": our conceptions of objectivity, agency, the self, the body. Using authors from Hobbes to Freud (17th-20th centuries), focuses on the material media's role in changing epistemological formations. Visualization in biomedicine, including new developments in "virtual surgery." Hands-on construction of virtual worlds. Readings on the new hypermedia guide study of emerging practices of reading and rhetoric. GER:3b (DR:9)

5 units, Win (Lenoir)

35Q. Stanford Introductory Dialogue: 20th-Century History as Lived Experience—Preference to sophomores. Intersections between individual lives and the cataclysmic events of the 20th century, e.g., WW I and WW II, the Spanish Civil War, the Holocaust, and the Soviet take-over of Eastern Europe. Critical examination of memoirs, autobiographies, and fiction of well-known 20th-century writers and politicians (Koestler, Brittain, Orwell, Remarque, Churchill, and Kundera) evaluate the uses of personal memory for the historian. What can individual accounts tell us about 20th-century history which a general narrative cannot? How are these accounts limited as historical sources? What are the
politics of memory and how have they shaped the history of the 20th century?
2 units, Win (M. L. Roberts)

48Q. Stanford Introductory Seminar: South Africa—Contested Transitions—Preference to sophomores. The inauguration of Nelson Mandela as president in May 1994 may have marked the end of an era and indeed a way of life for S. Africa. The changes have been dramatic and exciting, yet the legacies of racism and inequality persist. Focus: overlapping and sharply contested transitions. Who advocates and opposes change? Why? What are their historical and social roots and strategies? How do people reconstruct their society? Historical and current sources, including films, novels, internet.
3 units, Win (Samoff)

49Q. Stanford Introductory Seminar: Everyday Life in Africa—(Same as Linguistics 49Q.) Preference to sophomores. From U.S. media and our schools, Africa is seen as a place of poverty, disease, and ethnic conflicts. What it is like to live in Africa in 1997? Topics: family life, education, sports, money, art, entertainment, health.
4 units, Spr (Jackson, Leben)

51N. Stanford Introductory Seminar: Abraham Lincoln—Myth and Reality—Preference to freshmen. Comparison of what we know about Lincoln from documentary sources with his image in American memory and mythology. Students read/discuss Lincoln’s speeches and letters, a standard biography, essays on controversial aspects of his career, a study of how Lincoln has been remembered, and a recent novel based on his life. How history is made and remade by historians, artists, and interest groups within American society. GER:3a (DR:7)
5 units, Spr (Fredrickson)

53N. Stanford Introductory Seminar: Reflections on the American Condition—American History through Literature—Preference to freshmen. Classics of American literature as cultural and historical documents, cultivating critical skills in reading texts from various perspectives: aesthetic, biographical, social, and historical. Readings: Harriet Beecher Stowe, Uncle Tom’s Cabin; short stories by Henry James and Edith Wharton; Richard Wright, Native Son; and David Guterson, Snow Falling on Cedars.
4 units, Aut (Kennedy)

60Q. Stanford Introductory Dialogue: Urban Inequality in America—Historical Approaches—Preference to sophomores. For students with interests in urban studies, public policy, and race relations. Introduction to historical attempts to grapple with the problem of urban inequality in the U.S. How social scientists have constructed the “underclass debate” and how historians have chosen to investigate and analyze urban social relations. Focus is on the later 20th century. Topics: housing and patterns of residential segregation, deindustrialization and labor markets, access to education.
2 units, Spr (Sawislak)

85Q. Stanford Introductory Seminar: Jews and Muslims—(Formerly 204C.) Preference to sophomores. The history of Jewish communities in the lands of Islam and their relations with the surrounding Muslim populations from the time of Muhammad to the 20th century. Topics: the place of Jews in Muslim societies, Jewish communal life, variation in the experience of communities in different Muslim lands, the impact of the West in the Modern period, the rise of nationalism, and the end of Jewish life in Muslim countries. GER:3b,4a (DR:7 or 2)
5 units, Spr (Rodrigue)

90Q. Stanford Introductory Seminar: Buddhist Political and Social Theory—Preference to sophomores. Contemporary Buddhist political theory and its historical and textual roots, emphasizing Tibetan, Thai, and Sri Lankan Buddhism. Topics: society and polity in Buddhist thought, Buddhist spiritual practice as social and political practice, sovereignty, the individual and society, Buddhist economic theory and practice, Buddhism and the state, Buddhist political and social theory in practice, differences between Vajrayana (Tibetan) and Theravada (Southeast Asian) Buddhist social theory. GER:3b,4a (DR:7 or 2)
5 units, Spr (Mancall)

RESIDENCE-BASED SEMINARS

5. Potter House Seminar on International Affairs: International Perspectives on Gender and Sexuality in Film—(AU)
1 unit, Win (Beinin)

5A. East House Seminar: Conflict and Crisis in Asia—Film series on 20th-century political crises in Asia. (AU)
1 unit, Aut (Neskar)

5B, C. East House Seminars—Topics to be announced. (AU)
1 unit, Win, Spr (Neskar)

INTRODUCTORY LECTURES

For students with little or no previous experience in college-level history, these courses survey a specific topic and introduce the methods of the discipline. All are meant to serve as gateways to more advanced course work within the department.

13. The Emergence of Modern Medicine—How did medicine emerge as a distinctive body of knowledge and as a profession? Why did physicians, rather than other medical practitioners, come to dominate medicine? The history of medicine from approximately 1000 to 1800. Topics: emergence of new ways of examining and treating the human body, religious and cultural significance of disease,
development of hospitals, rise of public health system. Emphasizes western Europe and Islam and (in some years) Asia and the Americas. GER:3a (DR:7)
5 units, Win (Findlen)

28. The Second World War—(Formerly 128.) The diplomatic, military, and political history of the war in Europe and America. Themes: the crisis in the international state system following WW I, the origins of WW II, the nature of wartime leadership, the relationship between strategy and politics, the mobilization of societies for war, the character of combat, war and race, and the afterlife of the war in public and private memory. GER:3b (DR:9)
5 units, Win (Kennedy, Sheehan)

61. The Constitution and Race—The relation between the development of American constitutionalism and the politics and jurisprudence of slavery and race during the creation of the federal republic, the crisis of Civil War and Reconstruction, and the civil rights revolution of the mid-20th century. GER:3b,4b (DR:3 or 9)
5 units, Spr (Rakove)

75. The United States and East Asia—Introduction to the history of political, social, military, and cultural interactions between the U.S. and the societies of E. Asia (China, Japan, Korea, Vietnam, and the Philippines) from the mid-19th century to the present. Major wars and diplomatic events, mutual perceptions, reciprocal consequences, and long-term trends generated by these events and the circumstances that brought them about. Structured as an American narrative with full voice to E. Asian perspectives. GER:3b (DR:9)
5 units, Aut (Chang, Duus)

80. Culture, Politics, and Society in Latin America—Introduction to the political and social history of Latin America. Emphasis is on the interaction between institutional change, social structure, and political movements, emphasizing the environment and cultural values. GER:3b (DR:9)
5 units, Win (Wirth)

88. Imagining Jewish Civilization—(Same as Religious Studies 29.) Interdisciplinary introduction to the various forms of Jewish self-expression, literature, religion, and history from the Biblical period to the present. Topics: power and powerlessness, conflicting notions of the divine, evil, beauty, community, gender, and learning through the ages. Guest lectures, films, reading of primary and secondary texts.
5 units (Eisen, Zipperstein) not given 1997-98

SOURCES AND METHODS SEMINARS
These are intended to introduce the undergraduate major or prospective major to the processes of historical investigation and interpretation by which archival material becomes narrative description and explanation, and by which interpretation itself becomes open to disagreement and revision. The object is to take the beginning student into the historian's workshop and to provide first hand experience in interpreting documents, constructing a coherent story from them, interpreting their larger implications, and in discovering why it is possible to agree on the facts but to disagree on what they mean. These courses are numbered 1 through 99 followed by the letter 'S.'

12S. Sources and Methods Seminar: Religion, Revolution, and Reaction in the German Reformation—In 1510 Germany and Switzerland were fundamentally unified in religion; by 1530 they were deeply, bitterly and often violently divided in religion and politics. What factors contributed to this upheaval? How did people react to religious change, and what moved those who sought to create or suppress it? Did true Christianity mean the scriptural transformation of the individual, sociopolitical revolution, or fidelity to tradition? The period of the origins of modern Western Christian pluralism. Background readings plus primary sources in translation. GER:3a (DR:8)
5 units, Aut (Gregory)

15S. Sources and Methods Seminar: The Medieval Church and Violence—Opposition to and sanctification of war and violence, including early Christian pacifism, the origins of the idea of crusade and of knighthood, and the fate of the Peace Movement of the 11th century. Using primary sources and secondary works, assesses ecclesiastical participation in military action and peace-making, and its causes and effects on the political and cultural order.
5 units (Buc) not given 1997-98

18S. Sources and Methods Seminar: Stories about Communism—Eastern Europe since 1945—An inside view of E. European society after 1945 and the ways in which communism was imagined, experienced, and remembered. How historians use fiction to move beyond the limits of traditional sources. Novels, drama, and short stories; discussions on communism in theory and practice, dissidence, exile, women and minorities under communism, and the search for post-communist identities.
5 units, Win (Koloski)

31S. Sources and Methods Seminar: The France of Louis XIV—Uses primary sources (in English translation) to address: how great a king was Louis XIV, the chances of escaping starvation, how people "made it" during the Old Regime, Fouquet's guilt or innocence, what mattered at the court, why peasants rebelled, how people lived their religion, what regulated population size.
5 units (Chappell) not given 1997-98

34S. Sources and Methods Seminar: Crime and Punishment in Europe, 1500-1800—Why did early modern European officials choose to punish crime through highly elaborate, public disfigurements of the criminals' bodies? Why did crowds...
gather to witness these spectacles? Why did people focus their concerns on an alleged crime such as Jewish ritual murder in one century, and witchcraft or highway robbery in another? Trends in early modern European rituals of punishment and definitions of crime through trial records, treatises, and images from 1500-1800.

5 units, Spr (Nummedal)

36S. Sources and Methods Seminar: Posing, Passing, and Pretending in Early Modern Europe—In the 16th-18th centuries, French Jews attended Mass, an Englishman passed himself off as Taiwanese, and a Spanish woman turned herself into a male conquistador in Peru. What was the difference between lying and self-fashioning? The boundary crossings of religion, race, gender, and class in memoirs, inquisitorial documents, and plays ask: was the early modern period the age of dissimulation?

5 units, Win (Weiss)

37S. Sources and Methods Seminar: Whores, Nymphs, and Charming ‘Tough Guys’—Images of Male and Female Identity in Interwar Europe—Sexual stereotypes in 1920s-30s Europe. Images of the “masculine woman,” the soldier, the “promiscuous flapper,” the “black athlete.” Why some became associated with the traumatic events of WW I, and others with progress and modernity. Why did sexual stereotypes flourish? Why did categories of sexual difference become symbols of cultural and social change in interwar Europe? Sources include literature, political documents, medical discourse, film, and paintings.

5 units, Win (Bruns)

40S. Sources and Methods Seminar: History of Tourism in the Modern Era—Tourism is an important industry in many countries. Millions of people travel as an accepted part of life. How did this come about? The origins of tourism in the 19th and early 20th centuries. Switzerland, Egypt, India, and East Africa as travel destinations. Primary documents (travel accounts, government records, traveler’s handbooks) explore the relationship of tourism to industrial capitalism and imperialism, the connection between travel and the travel literature industry, and the impact of tourism on travel destinations.

5 units, Aut (Anderson)

47S. Sources and Methods Seminar: Gender and History in Colonial Africa—Introduces gender into the study of African history. How gender has played an important role in shaping historical processes and in the interpretation of the past. The ways “men” and “women” were defined and the impact on social and political histories throughout the continent. The historical junctions at which precolonial and colonial conceptions of gender met, and the conflicts arising from these clashes.

5 units, Aut (Schler)

50S. Sources and Methods Seminar: Race and Popular Culture (in Black and White)—The evolution of the racial categories of black and white in popular culture, focusing on the emergence of cultural forms, genres, and movements after Reconstruction through WW II (e.g., dialect fiction, musical theater, early film, Harlem Renaissance). Connected to the development of these new forms is the refashioning and rearticulation of American ideas of white and black. GER:3a,4b (DR:3 or 7)

5 units, Spr (Thompson)

54S. Sources and Methods Seminar: Narrating Nature—American Environmental History—What role has nature played in shaping American history? How has the natural environment changed over time? What is nature? The environmental history of the U.S. from pre-European contact to present. Topics: colonial agriculture, 19th-century urbanization, science and technology, impact of the Cold War. Primary sources including maps, journals, laws, scientific reports, and art.

5 units, Spr (Pritchard)

56S. Sources and Methods Seminar: Advertising and Consumer Culture in the United States—The history of modern materialism through the study of advertising. Theoretical and critical perspectives on consumption and recent historical interpretations of advertising and consumer culture in the U.S., focusing on the problems of using advertisements as sources for historical analysis.

5 units (Corn) not given 1997-98

67S. Sources and Methods Seminar: Social Change in Industrializing America—A Case Study of Chicago—Chicago is a context for an examination of the social and cultural transformations of American society, 1870 to 1920. Topics: immigration and assimilation, creation and experiences of a new industrial workforce, machine politics, architecture and city planning, social reform, and race relations. Readings from contemporary materials (fiction, photographs, memoirs, municipal records, and social criticism). GER:3b (DR:9)

5 units, Aut (Sawislak)

73S. Sources and Methods Seminar: When Women Arrived—Gender, Race, and Citizenship in the United States—Immigration and naturalization policies have been central to official self-deﬁnitions of the nation state. How have these policies depended on the regulation of women’s sexuality and their role in the family? How have efforts to Americanize immigrant families through the media, public schools, and social services been directed at women and girls? How have non-West European immigrant women and their daughters become American women? Asian, Southeast Asian, Mexican, Jewish, and East European immigrant women’s experiences. Pamphlets, clothing, advertising,
tutions of rule; social hierarchy; interethnic rela-

East, and the Black Sea by the 18th century. Gover-

nance and society in conditions of autocracy: insti-

tions in empire; tension between center and periph-
ery; serfdom and agrarian economy; social values
and gender roles; popular religiosity; Russian Or-
thodoxy as institution and as arbiter of high culture;
18th-century immersion in European culture and
attendant social tensions. Interdisciplinary: guest
lectures on art and literature. Places eras of rapid
change and social mobilization (Ivan IV, Peter I,
Catherine II) in the long-term context.

5 units (Kollmann) not given 1997-98

120B. Imperial Russia, 1762-1917—State, soci-
ety, empire, and the international relations of Impe-
rial Russia (18th-19th centuries to 1917) Alternate
years with 120D. GER:3b (DR:9)

5 units, Win (Emmons)

120C. 20th-Century Russian and Soviet Histor-
y—The Soviet polity from establishment to col-
lapse in 1991. The transformation of imperial insti-
tutions and policies, visions and practices of revolu-
tion, social engineering, change through the trans-
formative drives of collectivization of agriculture,
Industrialization, Cultural Revolution and Terror,
the experience of WW II, and the routinization of
revolutionary ethos and decline in the postwar peri-
g. GER:3a (DR:7)

5 units, Au (Weiner)

121. Russian Jewish History, 1772-1917—The
social, economic, cultural, and political trends in
Russian Jewish life from the Polish partitions until
the 1917 Revolution: popular and elite cultures,
changing family and social patterns, government
attitudes toward Jews, perceptions of Jews in Rus-
sian culture, Jewish political cultures, and political
radicalism. Emphasis is on regional differences and
their impact on the character of Jewish life in the
areas of Belorussia, Lithuania, Ukraine, etc.

5 units (Zipperstein) not given 1997-98

125. 20th-Century Eastern Europe—Major his-
torical trends in 20th-century E. European history.
Empires and national movements. The creation of
independent Eastern Europe after WW I; social
movements and the emergence of dictatorships and
fascism in the inter-war period. WW II, Stalinism,
and destalinization in contemporary E. Europe.
GER:3a (DR:7)

5 units, Au (Naimark, Koloski)

SCHOOL OF HUMANITIES AND SCIENCES

UNDERGRADUATE LECTURES

101 through 199 are primarily lecture cours-
es.

EASTERN EUROPE AND RUSSIA

119. Aristocracies and Absolutism: Early Mo-
 dern Eastern Europe, 1400-1800—Societies and
culture of E. Europe (Belorussia, Boemia, Hun-
gary, Poland, Ukraine) in the late medieval and
early modern periods. The conflict of aristocratic
parliamentary governments with absolutist
states (Austria, Hungary, Prussia, Russia). E.
Europe’s development contrasted to the Russian
historical experience. GER:3b (DR:9)

5 units, Spr (Kollmann)

120A. Early Modern Russia, 1400-1762—Chro-
 nicles in the context of international trade and
geopolitics. The expansion of Russia from its 14th-
century origins to achievement of a multithein
empire stretching from Poland to Siberia, the Far
East, and the Black Sea by the 18th century. Gover-
nance and society in conditions of autocracy: insti-
tutions of rule; social hierarchy; interethnic rela-

5 units, Win (Brown, Miller)

110. Storming Heaven: Christianity in Conflict
in Early Modern Europe—What happens when a
culture holds that right religion is absolutely necessary for salvation, yet disagrees about its content? A multi-perspectival view of divergent Christian traditions from early 16th to the mid-17th centuries, with parallels to religious “hot spots” in our own world. Topics: the character of the late medieval Church, humanism and Catholic reform, Luther and the early evangelical movement, the rise and spread of Anabaptism, Calvin and the exploration of Calvinism, the Council of Trent and Counter-Reformation, the Wars of Religion in France and the Netherlands, and the process of confessionalization. GER:3a (DR:8)
5 units, Win (Gregory)

WESTERN EUROPE

127D. 20th-Century Germany—Germany’s tortured path from WW I through Nazism and the Holocaust, to the fall of the Berlin Wall. The search for national identity, roots of fascism; impact of war on society, gender relations, and art.
5 units (Sheehan) not given 1997-98

130. From Enlightenment to Revolution: France in the 17th and 18th Centuries
5 units (Baker) not given 1997-98

136A. European Thought and Culture in the 19th Century: From Romanticism to Modernism—Major European thinkers and intellectual movements from the Enlightenment to Modernism. Readings: Matthew Arnold, Jane Austen, Karl Marx, John Stuart Mill, Friedrich Nietzsche, Emile Zola, etc. GER:3a (DR:7 or 8)
5 units, Win (Robinson)

136B. European Thought and Culture in the 20th Century: From Freud to Foucault—Important European thinkers and intellectual movements of the 20th century, from Freud to Foucault.
5 units (Robinson) not given 1997-98

137. The Holocaust—The emergence of modern racism and radical antisemitism. The Nazi rise to power and the Jews. Antisemitic legislation in the 1930s. WW II and the beginning of mass killings in the East. Deportations and ghettos. The mass extermination of European Jewry. GER:3b (DR:9)
5 units, Aut (Rodrigue)

HISTORY OF SCIENCE AND TECHNOLOGY

133A. The Rise of Scientific Medicine—(Same as 333A) Intellectual, social, and institutional dimensions of the rise of scientific medicine in the 19th and 20th centuries. How did medicine become “scientific”? What differences did science make to the practicing physician? Why did it displace other approaches to medicine? Focus is on medicine in Europe and the U.S. 1800 to the present. Topics: development of experimental physiology, bacteriology, pharmacology, biomedical technology, nuclear medicine, biomedical imaging, computers in medicine, and prospects for bedside gene therapies; effects of scientific developments in biomedical science and technology on medical practice and therapy; the professionalization of medicine in comparative European and American contexts. GER:3b (DR:9)
5 units, Spr (Lenoir) not given 1997-98

133B. The Sociology of Scientific Knowledge—Classical problems in the sociology of knowledge in the writings of Marx, Durkheim, and Mannheim. Recent work in the social construction of scientific knowledge. Emphasis is on recent studies in the historical sociology of experimental science and lab practice. Using case studies and drawing on anthropological approaches in the works of Mary Douglas, Pierre Bourdieu, and others, explores a theory of practice and a critique of historically situated practical reason as the foundation of the sociology of scientific knowledge.
4 units (Lenoir) not given 1997-98

134A. The Industrial Revolution: Historical and Cultural Perspectives—The technological changes that constituted the Industrial Revolution in Europe and America within the context of social, political, economic, and cultural developments. The contemporary relevance of these historical studies to industrialization in certain Third World nations.
5 units (Hecht) not given 1997-98

139. The Scientific Revolution—Recent studies and related primary materials (in translation) reassess the claims made for the “scientific revolution.” Studies of early modern science have broadened our understanding of the period, from work on museums and gentlemanly trust to the sciences of non-European cultures.
5 units, Spr (Seaver) not given 1997-98

BRITAIN

141. Yorkist and Tudor England—The Making of a Modern State—The transition from the late medieval realm to the Renaissance monarchy, Henry VIII, the English Reformation, and the new conservatism of the Elizabethan regime.
5 units (Seaver) not given 1997-98
142. Revolutionary England, 1603-1689—Analysis of the conditions that led to the first of the modern revolutions, the collapse of the Stuart monarchy, the beheading of the king, the first and only English experiment with a republic, the attempt of the Restoration to recreate a stable royal absolutism, and its final defeat in the "Glorious Revolution" of 1688-89. Radical ideas emerging in the heat of revolution.

5 units (Seaver) not given 1997-98

144. Britain, 1688-1832—(Same as 244.) Combination survey/colloquium. Alternate meeting each week provides a broad knowledge of British society in its political, social, intellectual, and cultural aspects, and considers one text in depth (a historical study, a novel, etc.) for what it may say about Britain from the Glorious Revolution of 1688 to the Great Reform Act of 1832. GER:3a (DR:7)

5 units, Aut (Stansky)

145C. Modern Britain, including Ireland, 1830-2000—(Same as 245C.) Combination survey/colloquium. Each week, first meeting provides sense of British history, including Ireland, 1830 to the present in its political, social, intellectual, and cultural aspects. Second meeting considers one text in depth (a historical study, a novel, etc.) for what it may tell us, in the broadest and most particular senses, about the recent history of Britain. 5 units (Stansky) not given 1997-98

AFRICA

147A. African History in Novels and Film—Many of the principal episodes in African history have been captured in novels and, to a lesser extent, in film. What happens to history and historical understanding as they undergo transformation in imaginative literature and film. Does the African novel fairly represent history? Is film only an imperfect vision of African past events? GER:3a,4a (DR:2 or 7)

5 units, Win (Jackson)

147B. The Idea of Africa among African Americans—No group within the Black diaspora has developed more notions, sometimes competing, of Africa than African Americans since the late 18th century. The crucial moments in that envisioning of Africa, from the free Black identifications of the 1770s-1840s to Marcus Garvey's 1920s homeland ideologies and the 1990s Mandela fever. GER:3a,4b (DR:3 or 7)

5 units, Spr (Jackson)

148. Introduction to African History—African history from the discovery of early humans in E. Africa to the 1990s. Geared to students who want to master the basics of Africa's past while engaging more advanced analysis. Films, novels, autobiographies, slides, readings.

5 units (Jackson) not given 1997-98

148C. Africa in the 20th Century—The challenges facing Africans from when the continent fell under colonial rule until independence. Lectures are organized around case studies of colonialization and its impact on African men and women drawn from West, Central, and Southern Africa. Discussions on novels, plays, polemics, and autobiographies written by Africans. GER:3b,4a (DR:2 or 9)

5 units, Spr (R. Roberts)

THE UNITED STATES

115. Technology and Culture in 19th-Century America—The social and cultural aspects of technological change from the American Revolution through WW I. Emphasis is on technologies of production and consumption (armory practice, department stores); of temporal and spatial transformation (telegraphic time signals, railroads), simulation and reproduction (photography, phonograph), and communication and control (telephone, scientific management).

4-5 units (Corn) given 1998-99

150. African-American History—From African Origins to Emancipation and Beyond—Surveys African-American history through the Civil War. Slavery in Africa, the development of slavery in the Western Hemisphere, and the Atlantic slave trade. The evolution of slavery as an institution in America and the development of slave culture. The free black population and the emergence of abolitionism, growing regional tensions and war, and emancipation and its immediate effects. GER:3a,4b (DR:3 or 7)

5 units, Win (Thompson)

151. American Labor History—The experiences of American working people in the 19th and 20th centuries, and their role in the social and political life. Topics: changing characteristics of work, the working-class, trade unions and socialist movements, effects of mass immigration and migration, impact of race and gender in the workplace and the economy. Primary and secondary readings, lecture, and discussions.

5 units (Sawislak) not given 1997-98

152. American Spaces: An Introduction to Material Culture and the Built Environment—(Same as American Studies 152.) American history through the evidence of things, e.g., spaces, buildings, and landscapes of the "built environment." How to "read" such artifacts using methods and theories from anthropology, cultural geography, history, and other disciplines.

5 units (Corn) given 1998-99

154. Peace Studies—(Same as Political Science 133, Psychology 165, Education 173X.) Interdisciplinary, dealing with the challenges of pursuing peace in a world where the sources of conflict are many and regional, ethnic, and religious antagonisms are rising. The art of creating and maintaining peace is analyzed from historical, social, psycho-
American Experience—(Same as American Studies of Chicanas, racial segregation, cultural pros?
Mexican American experience. GER:3a,4b (DR:3)

164. Introduction to Race and Ethnicity in the American Experience—(Same as American Stud-
ies 164.) How race and ethnicity have influenced the American experience and how prevailing attitudes about racial and ethnic groups over time have affected the historical and contemporary reality of the nation's major minority populations. Focuses on the past two centuries. GER:3b,4b (DR:3 or 9)

5 units, Spr (Camarillo, Fredrickson)

165A,B,C. United States History from the Revolution to the Present—General sequence empha-
sizing political, social, and institutional history. Provides a broad foundation in U.S. history on which to base further work in history, literature, economics, political science, religious studies, art history, etc. Three parts form an integrated whole; any portion may be taken independently. Recommended as a prerequisite for advanced work in American history.

165A. Colonial and Revolutionary America—In alternate years, emphasis is on the de-
velopment of American society prior to the revolution, or on the political and social his-
tory of the Revolutionary era (1997-98). GER: 3b (DR:9)

5 units, Aut (Rakove)

165B. 19th-Century America—History of the U.S. in the 19th century. Emphasis is on the causes and consequences of the Civil War. Topics: Jacksonianism and the market revolu-
tion, slavery and the old south, sectional conflict, the rise and fall of Reconstruction, late 19th-century society and politics, and the cri-
sis of the 1890s. GER:3b,4b (DR:3 or 9)

5 units, Win (Sawislak)

165C. The United States in the 20th Century—Major political, economic, social, and diplo-
matic developments in the U.S. since the end of the 19th century. Themes: debates over the economic and social role of government (Progressive, New Deal, Great Society, and Reagan-Bush eras); ethnic and racial minori-

172A. The United States since 1945—Analyzes foreign policy and politics, and deals with social themes and intellectual history. GER:3b (DR:9)

4-5 units, Win (Bernstein)

172B. U.S. Women's History, 1820-1980—The transformation of Victorian womanhood in the late 19th century, including the workforce participation of immigrant and black women and the educational and professional opportunities for middle-class white
women, the impact of wars and depression on 20th-century women’s lives, and the rebirth of feminism.
5 units (Freedman) not given 1997-98

173C. Introduction to Feminist Studies—(Same as Feminist Studies 101A.) How gender inequality is created and perpetuated, and when feminist theory and movements emerge to respond to gender inequality. Topics: theories of inequality; history of feminism; international and multi-cultural perspectives on feminism; women's work, health, and sexuality; creativity, spirituality, and movements for social change. GER:3b,4c (DR:9f)
5-6 units, Aut (Freedman)

LATIN AMERICA

176. Spain in America, 1492-1825—The evolution of Spanish American civilization during the centuries of Spanish rule, emphasizing institutions, socioeconomic structure, class and ethnic attitudes, and cultural heritage that carried over into the modern world with political independence.
5 units (Staff) not given 1997-98

179. History of Mexico—Mexican history from the 16th-century Spanish conquest through troubled nationhood in the 19th and 20th centuries, emphasizing the interaction between indigenous and Iberian cultures and then on Mexican efforts, with political independence, to come to terms with the industrialized world while retaining national autonomy.
5 units, Aut (Maurer)

180. 20th-Century Brazil—Brazil, a continent-sized nation multi-ethnic society, is at a crossroad: how to achieve economic growth with social and regional equity in an era of trading blocs. Brazilian efforts to come to terms with its long colonial history based on export agriculture, slavery, and extractive industries, while developing an urban-based, industrial society. Brazil’s rise as a middle industrialized world while retaining national autonomy.
5 units, Aut (Maurer)

181. Brazil, a continent-sized nation multi-ethnic society, is at a crossroad: how to achieve economic growth with social and regional equity in an era of trading blocs. Brazilian efforts to come to terms with its long colonial history based on export agriculture, slavery, and extractive industries, while developing an urban-based, industrial society. Brazil’s rise as a middle industrialized world while retaining national autonomy.
5 units, Aut (Maurer)

182. 20th-Century Brazil—Brazil, a continent-sized nation multi-ethnic society, is at a crossroad: how to achieve economic growth with social and regional equity in an era of trading blocs. Brazilian efforts to come to terms with its long colonial history based on export agriculture, slavery, and extractive industries, while developing an urban-based, industrial society. Brazil’s rise as a middle industrialized world while retaining national autonomy.
5 units, Aut (Maurer)

183. Brazilian History—Brazilian history from the 16th-century Spanish conquest through troubled nationhood in the 19th and 20th centuries, emphasizing the interaction between indigenous and Iberian cultures and then on Mexican efforts, with political independence, to come to terms with the industrialized world while retaining national autonomy.
5 units, Aut (Maurer)

184. Jews in the 20th-Century United States
5 units (Zipperstein) not given 1997-98

188B.C. Jewish History from the Medieval Period to the Present—Designed as a sequence, but may be taken independently. (188B is in department fields III and IV; 188C is in III.)

188B. Jews in the Medieval World—The legal status, economic activities, communal organization, religious, intellectual, and social life of Jews in medieval societies from the beginnings of Jewish settlement into the 16th century, in Christendom and under Islam. Rabbinic culture and medieval Jewish philosophy, Jewish self-perceptions and attitudes to non-Jews, Jewish-Christian polemics, Church attitudes and policies to the Jews, antisemitism, expulsion and anti-Jewish violence.
5 units (Rodrigue) not given 1997-98

188C. Jews in the Modern World—Jewish history in the modern period. Possible themes: the fundamental restructuring of all aspects of Jewish existence under the impact of the Enlightenment and legal emancipation at the end of the 18th century in Western Europe, the transformation of Jewish life in Eastern Europe under the authoritarian Russian regime, the experience of colonialism in the Sephardi world, and the range of new ideologies (Reform Judaism and various Jewish nationalisms), the persistence and renewal of antisemitism, the destruction of European Jewry under the Nazis, the rise of new Jewish centers in the U.S., and the emergence of the State of Israel.
5 units (Zipperstein) not given 1997-98

MIDDLE EAST

185. Introduction to Islamic Civilization—Introduction to the societies and cultures in which Islam has been the dominant religious tradition, focusing on the Middle East. Topics: the faith of Islam; the career of the prophet Muhammad; Islamic political theory; Islamic law, philosophy, and science; relations among Islam, Christianity, and Judaism; modern currents in Islam.
5 units (Beinin) not given 1997-98

187B. The Middle East in the 20th Century—The history of the Middle East since WW I, focusing on the eastern Arab world, Egypt, the Fertile Crescent, and the Arabian Peninsula (The Mashrig) with some attention to Turkey, Iran, and Israel. GER:3a,4a (DR:2 or 7)
5 units, Aut (Beinin)

187C. Women in the Modern Middle East—Women’s role in the modern Middle East. Topics: work, religious expression, politics, and family life. Format: one film showing per week with associated lecture and discussion. GER:3b,4c (DR:9f)
5 units, Spr (Reynolds, Beinin)

189A. Israel: 1880 to the Present—The beginnings of the Zionist Movement, the establishment of the State of Israel, and the development of Israeli society, culture, and politics. Analysis of the ideologies and institutionalization of the Zionist movement and Jewish nationalism in its various forms: Ottoman and Mandate Palestine and the growth of the Jewish settlement there, including social experimentation, relationships with the Palestinians and their responses to Zionism; the revolt against the British. Israel since independence; its institutions, international relations, and relations with Jewish communities outside of Israel. GER:4a (DR:2)
5 units (Mancall) given 1998-99
SOUTH ASIA
5 units, Win (Mancall)

EAST ASIA
192A. Chinese History to the 13th Century—From Peking Man to Ghenghis Khan. Emphasis is on social, religious, and intellectual developments from the Earliest Times to the Mongol Invasion. GER:3a,4a (DR:2 or 9)
5 units, Aut (Neskar)

192B. Chinese History from the Mongols to Early Modern Times—From the late Yuan to the Taiping Rebellion. Emphasis is on socio-economic rather than the political history to expose students to a sophisticated society very different than their own. Recommended: 192A. GER:3a,4a (DR:2 or 7)
5 units, Win (Kahn)

192C. Modern and Contemporary Chinese History—(Same as 392C.) The social and political setting from about 1800 to 1911 and the overthrow of the last imperial dynasty, the Republican period to 1949, and the Peoples' Republic of China to the present. Structured around political history. The social, economic, and cultural currents. Recommended: 192A, 192B, or Political Science 115. GER:4a (DR:2)
5 units, Spr (Van Slyke)

194A. Early and Medieval Japan to 1500—Prehistoric origins of the people and culture, emergence of the first polity, Chinese influences, flowering of the native culture, the samurai, and feudal government. GER:3a (DR:8)
5 units, Aut (Mass)

194B. Late Medieval and Early Modern Japan—From the Warring States Period to the establishment and rise of the last Shogunal house, the Tokugawa. The social, religious, and political contours of the age.
5 units (Staff) not given 1997-98

194C. 19th-Century Japan
5 units (Staff) not given 1997-98

194D. The Rise of Modern Japan—Japanese history from 1840 to the present. Topics: the Meiji Restoration and its background, building a modern state, industrialization of the economy, the emergence of an imperialist power, the reorientation of postwar Japan, and the "economic miracle." Socio-economic change and political developments. GER:3b,4a (DR:2 or 9)
5 units, Spr (Duus)

UNDERGRADUATE COLLOQUIA AND RESEARCH SEMINARS
Colloquia consist of reading and discussion on specific historical themes. Short papers, reports, historiographical essays, and a final exam may be required. In all cases, colloquia are designed to examine issues of historical interpretation. Oral presentations are encouraged.
Undergraduate research seminars provide students with opportunities to conduct research using primary documents, engage in historiographical debate, or to interpret major historical events. Seminars may be offered for one or two quarters and they may be combined with a colloquium. In all cases, students write preliminary drafts of their research findings, present oral reports, and revise their papers.

Courses 200 through 299 are primarily for juniors and seniors majoring in history. Admission is by consent of the instructor.

200A,B,C. Senior Research I, II, and III
1-5 units (Staff)

200H. History Honors Colloquium
3 units, Spr (Gregory)

200M. Undergraduate Directed Research: Martin Luther King, Jr. Papers Project
units by arrangement (Carson)

200W. Undergraduate Directed Reading
units by arrangement (Staff)

200X. Undergraduate Directed Research and Writing
units by arrangement (Staff)

GENERAL

202. Undergraduate Colloquium: Introduction to Problems of Historical Interpretation and Explanation—(Same as 302A.) Focus is on problems of historical narrativity: the relationship between the past and stories about the past, history and the novel; other epistemological issues.
5 units, Spr (Emmons)

203A. Undergraduate Colloquium: Collaboration—(Same as 303A.) Narratives of military occupation or colonial rule celebrate the heroism of resistance. However, many people under occupation choose instead to collaborate with the enemy. What is collaboration, and what are its moral foundations? Who are collaborators, and what interests do they represent? Is collaboration or resistance the better defense of the people, or are these false choices? To what extent does every state rest on a structure of collaboration? The 1640s Manchu occupation of China, 19th-century British occupation
of India, 1931-45 Japanese occupation of China, 1940-45 German occupation of France.

5 units, Win (Brook)

203B. Undergraduate Colloquium: Theories of World History—(Same as 303B.) Western historical practice has been shaped fundamentally by the West’s historical encounter with the Third World, e.g., the formation of theories of world history to explain what Europeans had previously not known and needed to understand. Early theorizations arising out of contact historiography; the world-historical theories of Hegel, Marx, and Weber; modernization, comparative history, world-systems analysis, and post-colonialism as competing ways of writing the world into existence.

5 units, Spr (Brook)

205A. Undergraduate Colloquium: Private Lives, Public Stories—Autobiography in Women’s History—(Same as 306.) Autobiographies and other sources. The changing contexts of women’s lives and the way women’s actions have shaped and responded to those contexts.

5 units (Chappell) not given 1997-98

EASTERN EUROPE AND RUSSIA

217. Undergraduate Colloquium: Men, Women, and Power in Early Modern Russia, 1500-1800—(Same as 317.) Social values, gender relations, and social change in an era of rapid change; challenges to established norms by new constructions of deviance (witchcraft; religious reform and revolt) and by new standards of civility; encounters with non-Russians and construction of national consciousness. Social values as political ethos: patrimonial autocracy and the reality of female rule in the late 17th and 18th century.

5 units (Kollmann) not given 1997-98

219S. Undergraduate Research Seminar: The Soviet Civilization—(Same as 419.) Socialist visions and practices of the organization of society and messianic politics; Soviet understanding of mass violence, political, and ethnic; and living space. Readings of secondary and primary sources and writing of a research paper or a historiographical essay.

5 units, Spr (Weiner)

221A. Undergraduate Colloquium: “Christ of Nations?”—The Dilemmas of Modern Poland—The cultural, ethnic, religious, political, historical, and moral bases for Polish definitions of national identity and sovereignty 1863 to the present. Poland’s varied experiences under foreign domination and democratic self-rule; readings from 19th-century romantic texts defining Poland as the “Christ of Nations,” Solidarity manifestos, and analyses of the post-1989 period.

5 units, Spr (Koloski)

221C. Undergraduate Colloquium: Historiography of the Soviet Union—(Same as 321C.) Introduces the major schools of interpretation of the Soviet phenomenon through works representative of a specific school in chronological order from the first major interpretation of the Soviet polity by Trotsky to the current postmodernist theories.

5 units, Aus (Weiner)

221S. Undergraduate Research Seminar: War, Time and Postwar Poland—(Same as 421.) The problems of German and Soviet occupation. Polish resistance during the war, dilemmas of Polish politics, the end of the war and beginning of peace. The relationship between social changes and political movements. The complex nationality issues involving Germans, Jews, Poles, Russians, and Ukrainians.

5 units (Naimark) not given 1997-98

222A. Undergraduate Colloquium: Myths and Identities in Modern Ukraine—(Same as 322A.) The evolution and interaction between various national identities of stateless Ukrainian populations throughout the century until Ukrainian statehood in 1991. Focus is on the core of the Ukrainian population; the Soviet Union; and Ukrainian populations in Poland, Czechoslovakia, Romania, and Hungary. Ethnic, regional, and political visions of national identities, the emergence of mass political movements, the rise of radical ideologies and regimes, the experience of WW II and the unification of Ukrainian land and people, and the struggle for definitive national myths to the present.

5 units (Weiner) not given 1997-98

223. Undergraduate Colloquium: Honor, the Law, and Modernity in Early Modern Europe—(Same as 323.) How individuals constructed their sense of honor in Europe (including Russia) from medieval times to the 18th century, and how they defended honor through law and litigation, extra-legal sanctions (feuds, duels) and ritual (charivari). The rise of the duel as a turning point in Europe towards modern concepts of honor and civility, social hierarchy, and legal practice.

5 units, Win (Kollmann)

224. Undergraduate Colloquium: Stalinism in Eastern Europe—(Same as 324.) The origins and history of Stalinism in Eastern Europe. The ways European countries confronted the Stalinist past. Readings on historical and literary representations of Stalinist theory and practice.

5 units (Naimark) not given 1997-98

226. Undergraduate Colloquium: Modernity, Revolution, and Totalitarianism—(Same as 326.) Analysis of modern revolutionary and totalitarian politics based on readings of monographs on the Medieval, Reformation, French Revolutionary, and the Great War eras which deal with relevant themes. Topics: the essence of modern ideology, the concept of the body national, state terror, charismatic
leadership, gender assignments, private and public spheres and identities.

5 units, Win (Weiner)

MEDIEVAL AND EARLY MODERN EUROPE

207. Undergraduate Colloquium: Intolerance or Symbiosis? Judaism, Christianity, and Islam—Medieval Spain from the Islamic conquest of 711 to the Christian expulsion of the Jews in 1492. Forms of confrontation (theological debate to systemic violence) and forms of confluence (conversion to cultural overlap), and hostile indifference between Jews, Christians, and Muslims. What were the undercurrents of aggression that gave rise to persecution of the 'other' in medieval Spain? What were the elements of commonality between groups that gave rise to great intellectual advancements? The dynamics of the three religions elsewhere in the medieval Mediterranean.

5 units, Win (Miller)

210A. Undergraduate Colloquium: The Language of Politics in the Middle Ages—(Same as 310A.) The different methods through which political theory was articulated and communicated and a culture of politics created: language proper, and its grammar (as in biblical exegesis and other mediums), gestures (and the theory of gestuality), royal proclamations, rituals (peace-making and intellectual resolution, royal funerals, advents, and coronations), and iconography.

5 units (Buc) not given 1997-98

211. Undergraduate Colloquium: Body, Gender, and Society in Medieval Europe—(Same as 311.) Secondary sources (historical, literary, theological, and anthropological studies). Issues: transformations in representations of the body, gender, sexuality, and in women's place in society (or social representation) in Western Europe between the 3rd and 14th century. Were these processes related with one another and with social changes? Analytically straddles the realm between bodification of spiritual powers and control (or manipulation) of the body in society, from the cult of relics to asceticism.

5 units (Buc) not given 1997-98

213A. Undergraduate Colloquium: New Worlds, Imaginary Worlds—(Same as 313A.) Why does the idea of "utopia" first emerge in the Renaissance? What does it mean to imagine a society? During the 16th and 17th centuries Europeans developed greater knowledge of other parts of the globe (Americas, Asia) and began to explore questions of nature and society in new ways, looking more critically at their own society and others. Topics: travel, knowledge, and experience; changing definitions of humanity; reason and imagination; order and deviance in the age of Columbus, More, Galileo, and Kepler.

5 units, Aut (Findlen)

213B. Undergraduate Colloquium: Heretics, Prostitutes, and Merchants—Venice and its Empire—(Same as 313B.) What was life like on the edge of the Mediterranean in a city with contacts that stretched from the Otooman Empire to the Americas? During the Renaissance, Venice was one of the most ethnically and culturally diverse regions of Europe, with a history of religious and political dissent and a flourishing artistic tradition. Topics: commerce, politics, and society; gender, sexuality, and family; religious minorities (Jews, moriscos, heretics); knowledge and culture.

5 units, Win (Findlen)

215. Undergraduate Colloquium: Religion and Society in Early Modern Europe—(Same as 315.) Introduction to recent research on Christianity in early modern Europe, supplemented with primary sources. The dialectical relationship by which religion influenced other domains of human life, and was in turn influenced by them. Possible topics: religion in relationship to gender and family life, the Reformation in urban context, printing and literacy, oral and visual communication, individual and collective devotion, confessionalization, and refugees and religious minorities. Readings are multinational and multiconfessional to acquaint students with the range and diversity of the phenomenon.

5 units, Spr (Gregory)

216. Undergraduate Colloquium: When Worlds Collide—The Trial of Galileo—In 1633, the Italian mathematician Galileo was tried and condemned for his advocacy of a sun-centered cosmology. The Catholic Church did not publicly admit that Galileo was right until 1989. What does this tell us about the relationship between science and religion? Why has the "Galileo affair" continued to be a discussed episode in Italian history and the history of science? Examines documents from Galileo's trial and related literature on Renaissance Italy. Students critique historians' interpretations of this event.

5 units (Findlen) not given 1997-98

WESTERN EUROPE

227. Undergraduate Colloquium: War and Peace in the 20th Century—(Same as 327.) The diplomatic and military crises from the origins of WW I to the collapse of Yugoslavia. Readings include historical analyses and original documents.

5 units, Spr (Sheehan)


5 units, Spr (Kennedy, Sheehan)

230. Undergraduate Colloquium: Postwar Capitalism and the Problem of Dissent—The collapse of Marxism as the framework for legitimate dissent has paralyzed critical theory; the fundamental and philosophical problem. Themes: structure of post-
WW II capitalism; the ways contemporary mass culture shapes and limits debate about that structure; the crises of Marxism and the problem of where a critical theory must begin reconstruction. Points of departure: the U.S., France, and their interaction since 1944.

3 units, Win (Hastings-King)

232A. Undergraduate Colloquium: Shopping—A History—European consumer culture from its inception in the 18th century to its increasing dominance of all aspects of life in the 20th century. Why have commodities come to play such an important part in our culture? How was the creation of the department store a watershed event in modern history? What are the politics of consumerism, from the bread riots of the French Revolution to the fashions of the 1920s? Emphasis is on the relation between gender and commodity culture, particularly the image of woman as family consumer and "kleptomaniac."

3 units, Aut (M. L. Roberts)


3 units, Spr (Robinson)

238S. Undergraduate Research Seminar: Europe 1880-1918—The Fin de Siecle and the Great War—The period from 1880-1914 represents a transition from an optimistic, naive age to one that knew moral relativism, total war, and material comfort and great genius. Through art, fiction, autobiography, psychology and cultural history, how the "age of innocence" ended and the 20th century began.

3 units (M. L. Roberts) not given 1997-98

HISTORY OF SCIENCE AND TECHNOLOGY

234A. Undergraduate Colloquium: Technology in 20th-Century America and Europe—The history of 20th-century western technology. Topics: the rise of the engineering profession, labor and technological change, the emergence of technocratic ideologies, and the rise of large-scale technological systems.

5 units, Win (Lecuyer)

234B. Technology and Society—(Same as 334A.) Historical and theoretical treatments of the relationships among technology, society, politics, and culture. Concepts include large-scale systems, ideology, power, gender, and metaphor.

5 units (Hecht) not given 1997-98

274A. Undergraduate Colloquium: Body Works—Medicine, Technology, and the Body in Late 20th-Century America—(Same as 374A.) The influence of new medical technologies (organ transplantation, endoscopic surgery, genetic engineering, computer-aided tomography, medical imaging) on the American imagination from WW II to the 1990s.

5 units, Win (Lenoir)

BRITAIN

240. Undergraduate Colloquium: Shakespeare's London—The Social and Cultural Consequences of Growth—Between 1500 and 1700 London grew from a late medieval town of 50,000 to a metropolis of more than 500,000, the largest city in Western Europe. The problems such unprecedented growth generated, ranging from Crown attempts to limit and control growth to the city magistrates' measures to meet the needs of the growing number of the poor and sick. The official image the city presented in its Lord Mayor's shows and the image of urban life presented in the new popular theater.

5 units (Seaver) not given 1997-98

241S. Undergraduate Research Seminar: From Reformation to Revolution in Early Modern England—Sources for England from 16th-century Protestant Reformation to the civil wars and revolution in the mid-17th century are unusually rich. The types of records (private diaries and letters to the official proclamations, and state papers) define the question that shapes the investigation. Critiques of a draft of the research paper.

5 units (Seaver) not given 1997-98

242S. Undergraduate Research Seminar: Exploring Modern Britain through Documents and Images Held at Stanford—Students choose a British text, artifact, or picture from the Stanford collections from a preselected list and discover British society by writing about it.

5 units, Win (Stansky)

244. Undergraduate Colloquium: Britain, 1688-1832—(Same as 144.)

5 units, Aut (Stansky)

245C. Undergraduate Colloquium: Modern Britain, including Ireland, 1830-2000—(Same as 145C.)

5 units (Stansky) not given 1997-98

AFRICA

246B. Undergraduate Colloquium: The Great Mau Mau Rebellion in 1950s Kenya—(Same as 346B.) The Mau Mau rebellion in 1950s Kenya was one of the most significant and controversial. Within the last decade, literature has emerged to sort out the rebellion. Novels, film, autobiographies, historical writing, and popular culture artifacts.

5 units, Win (Jackson)

247. Greater East Africa and its Historical Writing—(Same as 347.) Greater E. Africa contains Kenya, Tanzania, Uganda, Ethiopia, parts of Zaire, and Mozambique. From this area has come a dy-
namic historical literature (especially about women, the colonial period, and the purpose of history).

5 units, Aut (Jackson)


5 units (R. Roberts) not given 1997-98

248. Undergraduate Colloquium: Popular Culture in Africa—(Same as 348.) African culture rarely appears in historical research. The classics in this field; case-studies such as the role of the griot, women as diviners and seers, Euro-African dress and fashion, the image of Europeans in Africa, highlife music in Ghana, emblems in the Mau Mau rebellion, etc.

5 units (Jackson) not given 1997-98

248A. Undergraduate Colloquium: The End of Slavery in Africa and the Americas—(Same as 348A.) Comparative social history of the end of slavery in the Caribbean, the American South, and Africa. Interpretations of the social transformations. Topics: motivations for abolition of slavery, meanings of freedom in different societies, and processes of adaptation to new political economies of work.

5 units, Win (Roberts)

248D. Undergraduate Colloquium: Law and Colonialism in Africa—(Same as 348D.) Law in colonial Africa provides an opportunity to examine the meanings of social, cultural, and economic change in the anthropological, legal, and historical approaches. Court cases are a new frontier for the social history of Africa. Topies: meanings of conflicts over marriage, divorce, inheritance, property, and authority.

5 units (R. Roberts) not given 1997-98

248S. Undergraduate Research Seminar: Colonial States and Societies in Africa—(Same as 448A.) Students examine the encounter between African societies and European colonialism in the colony or region of their choice. Approaches to the colonial state, tours of primary source collections in the Hoover Institution and Green Libraries. Students present their original research findings and may continue research for a second quarter.

5 units (R. Roberts) not given 1997-98

249A. Undergraduate Colloquium: The Issue of Greatness in Black History—(Same as 349A.) A major tension in the writing of Black history is between the public demand for greatness, achievements, monuments, and firsts and the academic historian's skepticism about this approach. Why greatness is thought essential in Black mass history and how academic historians have reacted to this pressure.

5 units (Jackson) not given 1997-98

THE UNITED STATES

250. Undergraduate Colloquium: American Popular Culture—The development and evolution of popular culture in the U.S. The 19th-century emergence of blackface minstrelsy and popular entertainments such as domestic fiction (authored primarily by women), vaudeville and musical theater, dime novels, early film, and jazz. Emphasis on race, class, and gender analyses.

5 units (Thompson) not given 1997-98

251A,B. Undergraduate Colloquium: Poverty and Homelessness in America—Students participate in an internship with the Emergency Housing Consortium, the primary agency providing shelter for homeless people in Santa Clara and San Mateo counties, while learning about homelessness and poverty through required readings/discussions. Prerequisite: interview with the instructor.

5 units (Camarillo) given 1998-99

252. Undergraduate Colloquium: Decision-Making in International Crises—The A-bomb, the Korean War, and the Cuban Missile Crisis—For advanced undergraduates. Examines three sets of events: the atomic bombing of Japan, the Korean War, and the Cuban missile crisis.

5 units, Aut (Bernstein)

252S. Undergraduate Research Seminar: Museums and History—How museums and historic sites have interpreted the past. History of museums, relationship of academic scholarship to popular exhibition, the politics of public memory, and the effect of museum display on the meaning of objects. Required field trips.

5 units (Corn) not given 1997-98

253. Undergraduate Colloquium: Topics in African American History—The Great Migration—Focus is on the massive movement of African Americans from the rural south to the urban north from Reconstruction through WWI. The motivations for and consequences of this migration. Topics: urbanization, immigration, class dynamics within the African American community, gender roles, race progress and leadership, color consciousness, and the emergence of African American urban culture.

5 units, Spr (Thompson)

254S. Undergraduate Research Seminar: U.S. Women's History—For History or Feminist Studies majors only. Students learn bibliographic, research, and writing skills through the study of 20th-century women's reform efforts, utilizing primary sources available in Green Library and culminating in a substantial research paper. Prerequisite: at least one U.S. history course, consent of instructor. Recommended: 173B.

5 units (Freedman) not given 1997-98
255A. Undergraduate Colloquium: Culture and Ideologies of Race—(Same as 355A.) How culture is used to create, reify, and subvert categories of race in the U.S. The processes of cultural exchange and contestation which forge and dismantle racialized identities. Topics: the uses of memory and nostalgia, the introduction of new cultural technologies, and gender and class as categories which define and are defined by race.
5 units, Aut (Thompson)

256. Undergraduate Colloquium: Topics in Mexican American History—(Same as 356.) Topics from the 19th and 20th century: immigration from Mexico, the Americanization of Mexican society in the Southwest, the Mexican working class, intraethnic conflict, the Chicano movement of the 1960s, the making of barrios, the role of Mexican American women, and others. Focus is on the 20th century.
5 units (Camarillo) not given 1997-98

257. Undergraduate Colloquium: Immigrants and Racial Minorities in American Cities—Comparative Perspectives—The urbanization of major ethnic immigrant and racial minority groups in American cities during the 20th century. Historical case studies of different groups and social science theories and historical interpretations. The urban histories of Euro-Americans, African Americans, Mexican Americans, Asian Americans, and Native Americans in comparative perspective.
5 units (Camarillo) not given 1997-98

258. Undergraduate Colloquium: Modern America in Historical Perspective—The historical roots of several issues in contemporary American society: changing patterns of income distribution, the legacy of the "Great Society" and Reagan-era policies, the evolution of political parties, the changing situation of women, race relations, and immigration. Recommended: background in 20th-century American history.
5 units, Win (Kennedy)

259. Undergraduate Colloquium: Race and Ethnicity in the United States and South Africa—(Same as 359.) The comparative history of black-white relations in the U.S. and S. Africa. Topics: white racist ideologic patterns of segregation, Ethiopianism, Pan-Africanism and the Garvey Movement, nonviolent protest, and Black Power/Black consciousness. Prerequisite: 157 or 164, or equivalent.
5 units, Aut (Fredrickson)

259S. Undergraduate Research Seminar: The United States and the Vietnam War
5 units (Chang) not given 1997-98

260A. Undergraduate Colloquium: Perspectives on American Identity—Analysis of changing interpretations of American character and "Americanness" since the 17th century.
5 units (Corn) not given 1997-98

260S. Undergraduate Research Seminar: The Labor History of California—Drawing on extensive collections available at Green Library, students research and write a substantial original research paper concerning work and working people in California. Discussions of relevant historiography, library tours, research exercises, and presentations of work-in-progress. Prerequisites: 151 or consent of instructor.
5 units, Spr (Sawislak)

261. Undergraduate Colloquium: Nuclear Weapons and International Relations—Theories and History—(Same as 361.) Case studies involving nuclear weapons and related international relations theory.
5 units (Bernstein, Holloway) not given 1997-98

262S. Undergraduate Research Seminar: Science and High Technology in the Silicon Valley, 1930-1980—(Same as 462.) The technological, political, economic, and spatial dimensions of the rise of Silicon Valley from the 1930s to the early 1980s. How did Silicon Valley arise? What sustained its growth? How did it function? How did it evolve? Archival research and oral history. Focus is on radiotubes, microwave devices, semiconductors, and computers; economies of skills; university-industry relations; political dissent and the counterculture; and the techno-scientific policies of the Cold War state. Comparison with Route 128.
5 units (Lenoir) not given 1997-98

263A. Undergraduate Colloquium: The Automobile Industry in 20th-Century America—Examines one of the nation’s major industries from the perspective of its products, workers, and wide-ranging influences. Topics: origins and consequences of the industry’s geographical concentration in Michigan; evolution of assembly line work and other forms of automotive labor; influence of automobiles on the built and natural environments; cars and government regulation; and recent challenges to the industry stemming from technological change, foreign competition, and environmentalism.
5 units (Corn) not given 1997-98

264S. Undergraduate Research Seminar: Martin Luther King, Jr. and the Modern Civil Rights Movement—Supervised research projects using the resources of the King Papers Project at Stanford.
5 units (Carson) not given 1997-98

265. Undergraduate Colloquium: New Research in Asian American History—(Same as 365.) Asian American studies is a rapidly developing field, with new narrative material and methodologies. Newly published studies in history and related disciplines—Discussion of texts and exploration of possible
research work. Recommended: previous exposure to Asian American Studies.

5 units, Spr (Chang)

265A. Undergraduate Colloquium: The History of Sexuality in the United States—(Same as 365A.)

For graduate students and senior History or Feminist Studies majors. Readings on the social construction of sexuality, primarily U.S., in the 19th and 20th centuries. Topics: the histories of contraception and abortion, prostitution, homosexuality, race and sexuality, and social and political movements shaping sexual values and practices.

5 units, Spr (Freedman)

266. Undergraduate Colloquium: The Historical Study of Cities—How do historians portray and interpret the modern city? Historical accounts of urban growth, politics, social life, and spatial change in 19th- and 20th-century European and American cities. Topics: neighborhood formation; housing; municipal policy and finance; public health; city planning and urban form; popular culture; representation of the city; race, ethnic, and class relations.

5 units, Win (Cahn)

268. Undergraduate Colloquium: Adolescence and Youth Cultures in Modern America—The changing meaning and experience of adolescence in U.S. society. Themes: changing definitions of adolescence, social regulation of adolescent behavior, the emergence of a shared "teen culture" and teen market and narrower youth subcultures, the role of sexuality in coming of age experiences. Readings incorporate a variety of disciplinary perspectives.

5 units, Win (Cahn)

269. Undergraduate Colloquium: The African-American Community Organizing Tradition—(Same as 369.) Because the political rights of African-Americans have often been restricted, black people have developed innovative ways of mobilizing their collective power to achieve group advancement. The history of modern African-American grassroots movements and the organizing techniques that have enabled people without many resources to liberate themselves. Focus is on the Student Nonviolent Coordinating Committee (SNCC), the Southern Christian Leadership Conference (SCLC), the Black Panther Party (BPP), etc.

5 units, Aut (Carson)

270. Undergraduate Colloquium: The History of American Indians since 1934—Native Americans from the passage of the Indian Reorganization Act in 1934 to the present. Topics: sovereignty, tribal governance, termination and relocation, AIM, the experiences of women, religious freedom, and self-determination.

5 units, Aut (Benson)

272A. Undergraduate Colloquium: American Foreign and War Policy at Home and Abroad from Pearl Harbor to Vietnam, 1941-68—Briefly considers WW II and focuses on the early Cold War and the Vietnam War. Dissent and the impact of the "national-defense system" on major domestic institutions and the relationships to American culture. Readings: John Dower, Paul Fussell, George Kennan, Dwight Macdonald, Robert Taft and Henry Wallace. Brings together different approaches from IR and American Studies.

5 units, Spr (Bernstein)

273A. Undergraduate Colloquium: Childhood in Modern American History—(Same as 373A.) The experience of children, and ideas and behavior toward children from the early 19th century to the present. How are children perceived and cared for within families, and what was growing up like for children of different races, genders, and economic classes? In the public sphere, how has our society defined its responsibility toward its children and treated those dependent on public care? What can history tell us about the future of children?

5 units, Spr (Horn)

LATIN AMERICA

276. Undergraduate Colloquium: The Creation of North America—(Same as 376.) Responding to rapid changes in the world economy, Canada, the U.S., and Mexico are developing common interests in a shared regional space. This convergence is transforming relations between three sovereign states, each with its distinct political system, national history, cultures, and identities. The historical origins of the convergence, from the clash of European empires and native societies, to the development of viable nation states in Canada and Mexico as influenced by the American Civil War and the intersecting of frontiers and railroads, and the effects of WW II through the movement of peoples and development of complex identities today.

5 units (Wirth) not given 1997-98

278. Undergraduate Colloquium: Historical Aspects of Underdevelopment in Latin America—The methods and approaches of economic history. Emphasis is on the critical analysis of scholarly studies of issues in Latin American economic growth addressed by economic historians, including the creation of national transport systems, the growth of industry, the economics of slavery, and the long term effects of export oriented growth.

5 units, Spr (Maurer)


5 units, Win (Maurer)
281A. Undergraduate Colloquium: Environmental History of the Americas—(Same as 381A.) Environmental history approached topically, using examples from N. and S. America to survey and evaluate the current state of research.
   5 units, Spr (Wirth)

282. Undergraduate Colloquium: The Agrarian Origins of Underdevelopment in Latin America—(Same as 382.) Introduction to the study of Latin American agrarian economic history. The relationship between the productive organization of agriculture and long run economic growth, focusing on Mexico during the 18th, 19th, and 20th centuries. Works by development economists, social historians, and economic historians.
   5 units (Haber) not given 1997-98

283. Undergraduate Colloquium: The Process of Industrialization—Europe, the United States, and Latin America—(Same as 383.) Introduction to comparative economic history for graduate students. The literature on the transition to industrial societies during the 19th and 20th centuries in a variety of national contexts. Readings from the institutionalist, cliometric, and Marxist schools of economic history.
   5 units, Win (Maurer)

JEWISH HISTORY

287A. Undergraduate Colloquium: Modern Jewish Identity—(Same as 387A.)
   5 units (Rodrigue) not given 1997-98

289B. Undergraduate Colloquium: Zionism and its Critics—The major texts produced by the Zionist movement, emphasizing its early years between the 1880s and the 1917 Balfour Declaration. One of a range of forces in Jewish politics, Zionism was subjected to sustained scrutiny by orthodox Jews, liberals, socialists, etc. The movement and the criticisms engendered by it, within and beyond the Jewish world, especially in prestate Palestine.
   5 units (Zipperstein) not given 1997-98

MIDDLE EAST

285A. Undergraduate Colloquium: Problems in Israeli History—The National Identity and Political Culture of the Israeli State—Focus is on ideology, institutions, and politics. Themes: Zionism, non-Zionism, and anti-Zionism; religion and secularism; multi-ethnism; socialism; symbols; law.
   5 units, Aut (Mancall)

286. Undergraduate Colloquium: Economic and Social History of the Modern Middle East—(Same as 386.) The integration of the Middle East into the world capitalist market on a subordinate basis and the impact on economic development, class formation, and politics. Alternative theoretical perspectives on the rise and expansion of the international capitalist market are combined with possible case studies of Egypt, Iraq, and Palestine.
   5 units, Win (Beinin)

287S. Undergraduate Research Seminar: Topics in the Modern History of Egypt, Palestine, and Israel—(Same as 487.) Student-selected research topics with guided historiographical reading and discussions as an introduction.
   5 units (Beinin) not given 1997-98

288. Undergraduate Colloquium: Palestine and the Arab-Israeli Conflict—(Same as 388.) The Palestine-Zionist conflict 1882 to the present through reading and comparing representative expressions of competing historical interpretations. U.S. policy towards the conflict since 1948.
   5 units, Spr (Beinin)

289A. The Ottoman Empire—(Same as 389A.) Rise of the Ottoman Empire from the 14th to 16th centuries. The Balkans and the Middle East under Ottoman rule. Systems of governance and the economy of the Ottoman Levant. Onset of weakness and decline after the 17th century. European imperialism in the Middle East. Ottoman westernizing reforms in the 19th century. Rise of nationalism. The Balkan Wars, WW I, and the collapse of the Ottoman Empire.
   5 units (Rodrigue) not given 1997-98

EAST ASIA

291. Undergraduate Colloquium: Women in Japanese History—The historical experience of Japanese women, from Murasaki Shikibu to Aiyoshi Sawako, as reflected in their own writings and scholarly interpretations.
   5 units, Aut (Totman)

292. Undergraduate Colloquium: Postwar Japan—(Same as 392.) Discussion of various aspects of Japanese social history since 1945: the postwar emperor system, economic growth and urbanization, middle class culture, new religions, citizens' movements, the transformation of village life, the search for national identity, popular media.
   5 units (Duus) not given 1997-98

   5 units (Duus) not given 1997-98

292B. Undergraduate Colloquium: Aspects of Chinese Economic History from the High Middle Ages to Modern Times—Premise: economic information changes in meaning as history moves into different social formations. Where the ancient imperial state left its agrarian imprint on land formations and ownership patterns, a thousand years of
HISTORY 523

growth and the development of commerce, the emergence of complex systems of land ownership and tenancy, the appearance in late imperial and early modern times of demographic problems, questions of agrarian stagnation, rural commercialization, and the beginnings of an industrial economy.

5 units (Kahn) not given 1997-98

292S. Undergraduate Research Seminar: China in the Western Imagination, 16th-20th Century—500 years of the reinvention of China in the Western mind. Through the use of Jesuit correspondence, diplomatic reminiscence, missionary memoirs, modern journalism, travelers' accounts, and military logs, students construct a research project which explores subject (the viewer) and object (the viewed) in the early modern history of China.

5 units (Kahn) not given 1997-98

295A. Undergraduate Colloquium: The Korean War—Watershed in Asia—Preference to History and East Asian Studies majors. The background, origins, combat history, and cease fire of "the forgotten war" (1950-1953) that has had such influence on Asia. Enrollment limited to 15.

5 units, Win (Van Slyke)

296. Undergraduate Colloquium: Ordinary Lives—The Social History of Early Modern China—Explores ways of studying people who were not prominent in the conventional spheres of authority of high culture. Topics: migrations, disease, production and consumption, gender and family, popular culture and entertainments, the politics of banditry, etc., during Ming-Qing (16th-19th centuries). Prerequisite: consent of instructor.

GER:4a (DR:2)
5 units, Win (Kahn)

297A. Undergraduate Colloquium: A Cultural History of Chinese Science, Technology, and Medicine—(Same as 397A.) Interdisciplinary approach, drawing on cultural history, anthropology, gender studies, and philosophy to study Chinese science, technology, and medicine in its intellectual, social, and cultural context. Critically assesses the conclusions on "culture" derived from the received historiography on Chinese science. Emerging trends in current research.

5 units, Win (Kahn)

298. Imperialism, Colonialism, and National Identity in Modern Japan—(Same as 398.) The linkages between state building, economic change, territorial expansion, and national consciousness in late 19th- and early 20th-century Japan. Topics: the construction of race, the alien and the barbarian; the nature of the modern Japanese state; the economic roots of territorial expansion; styles and schemes of colonial domination and management; debates on Japan's relationships with Asia, the West, and its colonial subjects.

5 units, Win (Duus)

298A. Undergraduate Colloquium: Visions of Utopia—Travelers to China, 9th-20th Century

5 units (Kahn) not given 1997-98

299. Undergraduate Colloquium: Japan in the Age of Courtiers and Warriors, 1180-1333—(Same as 399.) Government and society during the period of Japan's transition from its classical to its medieval phase. Topics: law, justice, family, inheritance, war, religion, and the economy through the analysis of primary documents, chronicles, and sources in translation.

5 units, Au (Mass)

GRADUATE

300W. Graduate Directed Reading units by arrangement (Staff)

GENERAL

301. Graduate Colloquium: Historiography of American Education—(Same as Education 301.) Analysis of the literature of American education history for students who wish to do further work in the field. Weekly colloquium discussions, plus an opportunity to pursue specialized topics in small group tutorial sessions.

3-4 units (Tyack) not given 1997-98

301E. History of School Reform: Origins, Policies, Outcomes, and Explanations—(Same as Education 220D.) Restricted to undergraduates working on honors theses in Education and graduate students. School reform as an interaction between the broad context (social economic, political, and ideological factors), schools as institutions, and the goals and behaviors of groups and individuals. Why and how some school reforms persist, why some fail or fade, and why some recur periodically. Focuses on early 1900s, 1950s and '60s, and current state-driven changes. Students investigate a particular reform: its sources, policy development and implementation, and the consequences, intended and unintended, using one or more of the analytic frameworks presented. Enrollment limited to 30.

4 units (Cuban, Tyack) not given 1997-98

302A. Graduate Colloquium: Introduction to Problems of Historical Interpretation and Explanation—(Same as 202.)

4-5 units, Spr (Emmons)

303A. Graduate Colloquium: Collaboration—(Same as 203A.)

4-5 units, Win (Brook)

303B. Graduate Colloquium: Theories of World History—(Same as 203B.)

4-5 units, Win (Brook)

304. Approaches to History—Required of all first-year History Ph.D. students.

4-5 units, Spr (Brook)
305. Graduate Workshop in Teaching—Introduction to teaching, lecturing, and curriculum development.
   1 unit, Spr (R. Roberts)

306. Graduate Colloquium: Private Lives, Public Stories—Autobiography in Women's History—(Same as 205A.)
   4-5 units (Chappell) not given 1997-98

306A. Graduate Colloquium: The Modern Tradition—Capitalism, Imperialism, and their Critics—The tradition of social theory beginning with Marx's concept of capitalism and Lenin's theory of imperialism is elaborated by examining works arguing that gender and racial hierarchies are constitutive of capitalism. The dimensions of ideological and cultural domination, using the writings of Marx, Gramsci, and representatives of the cultural studies and subaltern studies schools including Start Hall, Gyan Prakash, Edward Said, and Paul Gilroy. The debate over postmodernism/late capitalism, and theory and strategy after the Gulf War.
   4-5 units, Aut (Beinin)

306B. Design and Methodology for International Field Research
   1 unit, Win (Duus, Kollmann, R. Roberts)

306C. History Wired—Overview, theoretical and applied, of electronic media as they relate to the various disciplines of historical research and teaching.
   3 units, Aut (Chappell, Lenoir)

EASTERN EUROPE AND RUSSIA

317. Graduate Colloquium: Men, Women, and Power in Early Modern Russia, 1500-1800—(Same as 217.)
   4-5 units (Kollmann) not given 1997-98

320A. Graduate Colloquium: Topics in Early Modern Russian History
   4-5 units (Kollmann) not given 1997-98

320B. Graduate Colloquium: Topics in Imperial Russian History
   4-5 units (Emmons) not given 1997-98

320C. Graduate Colloquium: Topics in 20th-Century Russian and Soviet History
   4-5 units (Weiner) not given 1997-98

321A. Graduate Colloquium: Topics in Early Modern Russian Historiography
   4-5 units, Win (Kollmann)

321B. Graduate Colloquium: Topics in Modern Russian Historiography
   4-5 units, Spr (Emmons)

321C. Graduate Colloquium: Historiography of the Soviet Union—(Same as 221C.)
   4-5 units, Aut (Weiner)

322A. Graduate Colloquium: Myths and Identities in Modern Ukraine—(Same as 222A.)
   4-5 units (Weiner) not given 1997-98

323. Graduate Colloquium: Honor, the Law, and Modernity in Early Modern Europe—(Same as 223.)
   4-5 units, Win (Kollmann)

324. Graduate Colloquium: Stalinism in Eastern Europe—(Same as 224.)
   4-5 units (Naimark) not given 1997-98

326. Graduate Colloquium: Modernity, Revolution, and Totalitarianism—(Same as 226.)
   4-5 units, Win (Weiner)

MEDIEVAL AND EARLY MODERN EUROPE

307A. Graduate Core Colloquium in Medieval European History
   4-5 units (Buc) not given 1997-98

309. Graduate Colloquium: The Varieties of the Renaissance—(Same as 409A.)
   4-5 units (Findlen) not given 1997-98

310A. Graduate Colloquium: The Language of Politics in the Middle Ages—(Same as 210A.)
   4-5 units (Buc) not given 1997-98

311. Graduate Colloquium: Body, Gender, and Society in Medieval Europe—(Same as 211.)
   4-5 units (Buc) not given 1997-98

313A. Graduate Colloquium: New Worlds, Imaginary Worlds—(Same as 313A.)
   4-5 units, Aut (Findlen)

313B. Graduate Colloquium: Heretics, Prostitutes, and Merchants—Venice and its Empire—(Same as 213B.)
   4-5 units, Win (Findlen)

315. Graduate Colloquium: Religion and Society in Early Modern Europe—(Same as 215.)
   4-5 units (Gregory) not given 1997-98

315A. Graduate Colloquium: Topics in Reformation History
   4-5 units, Win (Gregory)

316A. Graduate Core Colloquium: Europe in the 15th and 16th Centuries—(Formerly 310.)
   4-5 units (Findlen, Gregory) not given 1997-98

316B. Graduate Core Colloquium: Europe in the 17th and 18th Centuries—(Formerly 331B,C.)
   4-5 units, Aut (Baker, Chappell)

WESTERN EUROPE

327. Graduate Colloquium: War and Peace in the 20th Century—(Same as 227.)
   4-5 units, Spr (Sheehan)
328A. Graduate Colloquium: Problems in German Historiography
4-5 units, Aut (Sheehan)

331D. Graduate Core Colloquium on Modern Europe: Intellectual History
4-5 units, Aut (Robinson)

331E. Graduate Core Colloquium on Modern Europe: The 19th Century
4-5 units (Sheehan) not given 1997-98

331F. Graduate Core Colloquium on Modern Europe: Women and Gender
4-5 units, Win (M. L. Roberts)

332. Graduate Colloquium: Modern France
4-5 units (M. L. Roberts) not given 1997-98

333B. Graduate Colloquium: Reading and Research
4-5 units, Spr (Baker)

HISTORY OF SCIENCE AND TECHNOLOGY

333. The Darwinian Revolution—(Same as 133.)
2-4 units (Lenoir) not given 1997-98

333A. The Rise of Scientific Medicine—(Same as 133A.)
2-5 units, Spr (Lenoir)

334A. Graduate Colloquium: Technology and Society—(Same as 234B.)
4-5 units (Hecht) not given 1997-98

336A. Graduate Colloquium: Technology, Work, Culture in Comparative Perspective—Changes in the nature, culture, and organization of work in the 19th and 20th centuries. Readings on kinds of work (industrial, domestic, slave), the working body, gender and skill, and the relationships between technological and sociological change.
4-5 units (Hecht) not given 1997-98

374A. Graduate Colloquium: Body Works—Medicine, Technology, and the Body in late 20th-Century America—(Same as 274A.)
4-5 units, Win (Lenoir)

BRITAIN

341A. Graduate Colloquium: Topics in the Social and Cultural History of Early Modern England
4-5 units (Seaver) not given 1997-98

344A. Graduate Colloquium: Problems in Modern Britain
4-5 units, Win (Stansky)

AFRICA

346B. Graduate Colloquium: The Great Mau Mau Rebellion in 1950s Kenya—(Same as 246B.)
4-5 units, Win (Jackson)

347. Graduate Colloquium: Greater East Africa and its Historical Writing—(Same as 247.)
4-5 units, Aut (Jackson)

347B. Graduate Core Colloquium in African History: The Colonial Period
4-5 units, Win (R. Roberts)

348. Graduate Colloquium: Popular Culture in Africa—(Same as 248.)
4-5 units (Jackson) not given 1997-98

348A. Graduate Colloquium: The End of Slavery in Africa and the Americas—(Same as 248A.)
4-5 units, Win (R. Roberts)

348D. Graduate Colloquium: Law and Colonialism in Africa—(Same as 248D.)
4-5 units (R. Roberts) not given 1997-98

349. Graduate Core Colloquium: Precolonial Africa
4-5 units (R. Roberts) not given 1997-98

349A. The Issue of Greatness in Black History—(Same as 249A.)
4-5 units (Jackson) not given 1997-98

THE UNITED STATES

351A,B,C,D,E,F. Graduate Core Colloquium in American History
24-30 units

351A. Graduate Core Colloquium in American History—Part I
4-5 units, Aut (Rakove)

351B. Graduate Core Colloquium in American History—Part II
4-5 units, Aut (Sawislak)

351C. Graduate Core Colloquium in American History—Part III
4-5 units, Win (Fredrickson)

351D. Graduate Core Colloquium in American History—Part IV
4-5 units, Win (Freedman)

351E. Graduate Core Colloquium in American History—Part V
4-5 units, Spr (Chang)

351F. Graduate Core Colloquium in American History—Part VI
4-5 units, Spr (Bernstein)

355A. Graduate Colloquium: Culture and Ideologies of Race—(Same as 255A.)
4-5 units, Aut (Thompson)

356. Graduate Colloquium: Topics in Mexican American History—(Same as 256.)
4-5 units (Camarillo) not given 1997-98

359. Graduate Colloquium: Race and Ethnicity in the United States and South Africa—(Same as 259.)
4-5 units, Aut (Fredrickson)
361. Graduate Colloquium: Nuclear Weapons and International Relations—Theories and History—(Same as 261.)
   4-5 units (Bernstein, Holloway)
   not given 1997-98

365. Graduate Colloquium: New Research in Asian American History—(Same as 265.)
   4-5 units, Spr (Chang)

365A. Graduate Colloquium: The History of Sexuality in the United States—(Same as 265A.)
   4-5 units, Spr (Freedman)

369. Graduate Colloquium: The African-American Community Organizing Tradition—(Same as 269.)
   5 units, Aut (Carson)

372. Graduate Colloquium: Creating the American Republic
   4-5 units, Win (Rakove)

373A. Graduate Colloquium: Childhood in Modern American History—(Same as 273A.)
   4-5 units, Spr (Horn)

LATIN AMERICA

376. Graduate Colloquium: The Creation of North America—(Same as 276.)
   4-5 units (Wirth) not given 1997-98

381A. Graduate Colloquium: Environmental History of the Americas—(Same as 281A.)
   4-5 units, Spr (Wirth)

382. Graduate Colloquium: The Agrarian Origins of Underdevelopment in Latin America—(Same as 282.)
   4-5 units (Haber) not given 1997-98

383. Graduate Colloquium: The Process of Industrialization—Europe, The United States, and Latin America—(Same as 283.)
   4-5 units, Win (Maurer)

JE WISH HISTORY

384A. Graduate Core Colloquium in Jewish History, 17th-19th Centuries
   4-5 units, Aut (Rodrigue)

384B. Graduate Core Colloquium in Jewish History, 20th Century
   4-5 units (Zipperstein) not given 1997-98

387A. Graduate Colloquium: Modern Jewish Identity—(Same as 287A.)
   4-5 units (Rodrigue) not given 1997-98

MIDDLE EAST

386. Graduate Colloquium: Economic and Social History of the Modern Middle East—(Same as 286.)
   4-5 units, Win (Beinin)

388. Graduate Colloquium: Palestine and the Arab-Israeli Conflict—(Same as 288.)
   4-5 units, Spr (Beinin)

389A. Graduate Colloquium: The Ottoman Empire—(Same as 289A.)
   4-5 units (Rodrigue) not given 1997-98

390A. Graduate Colloquium: Topics in Middle-Period Chinese History
   4-5 units, Win (Neskar)

390B. Graduate Colloquium: Topics in Late Traditional Chinese History
   4-5 units, Aut (Kahn)

390C. Graduate Colloquium: Topics in Modern Chinese History
   4-5 units, Spr (Brook)

392. Graduate Colloquium: Postwar Japan—(Same as 292.)
   4-5 units (Duus) not given 1997-98

392A. Graduate Colloquium: Japanese Lives—Autobiography and History—(Same as 292A.)
   4-5 units (Duus) not given 1997-98

392C. Modern and Contemporary Chinese History—(Same as 192C.)
   4-5 units, Spr (Van Slyke)

395A. Graduate Colloquium: Early and Medieval Japan
   4-5 units, Win (Mass)

395B. Graduate Colloquium: Late Medieval and Early Modern Japan, 1560-1800
   4-5 units, Aut (Totman)

395C. Graduate Colloquium: Modern Japan
   4-5 units, Spr (Duus)

397A. Graduate Colloquium: A Cultural History of Chinese Science, Technology, and Medicine—(Same as 297A.)
   4-5 units, Win (Hart)

398. Graduate Colloquium: Imperialism, Colonialism, and National Identity in Modern Japan—(Same as 298.)
   4-5 units, Win (Duus)

399. Graduate Colloquium: Japan in the Age of Courtiers and Warriors, 1180-1333—(Same as 299.)
   4-5 units, Aut (Mass)

ADVANCED GRADUATE

Courses numbered 400 to 499 are intended primarily for second- and third-year graduate students, but other qualified students may be admitted by consent of instructor.

400X. Graduate Research
   units by arrangement (Staff)
HISTORY 419. Graduate Seminar: The Soviet Civilization—(Same as 219S.)
4-5 units, Spr (Weiner)

421. Graduate Seminar: Wartime and Postwar Poland—(Same as 221S.)
4-5 units (Naimark) not given 1997-98

433. Graduate Seminar: Modern Eastern Europe
4-5 units, Spr (Naimark)

MEDIEVAL AND EARLY MODERN EUROPE

409A,B. Graduate Seminar: Topics in the Renaissance—(409A is the same as 309.)
8-10 units (Findlen) not given 1997-98

411. Graduate Seminar: Medieval History
8-10 units, Win, Spr (Miller)

413. Graduate Seminar: Early Modern Europe
8-10 units, Win, Spr (Findlen)

WESTERN EUROPE

430. Graduate Seminar: The French Revolution
4-5 units (Baker) not given 1997-98

433A. Graduate Seminar: European History
8-10 units (Sheehan) not given 1997-98

435. Graduate Seminar: Modern Europe
8-10 units, Win, Spr (Staff)

437. Graduate Seminar: Modern European Cultural and Intellectual History
4-5 units (Robinson) not given 1997-98

HISTORY OF SCIENCE AND TECHNOLOGY

434A. Graduate Seminar: Topics in the History of Technology
4-5 units (Hecht) not given 1997-98

BRITAIN

442. Graduate Seminar: Early Modern England
4-5 units (Seaver) not given 1997-98

445. Graduate Seminar: Modern Britain
4-5 units, Spr (Stansky)

AFRICA

448A. Graduate Seminar: Colonial States and Societies in Africa—(Same as 248S.)
8-10 units (R. Roberts) not given 1997-98

THE UNITED STATES

451. Graduate Seminar: 20th-Century America
8-10 units, Win, Spr (Bernstein)

454. Graduate Seminar: Culture and Ideology in American History
4-5 units (Fredrickson) not given 1997-98

456A,B. Graduate Seminar: United States in the 20th Century
8-10 units (Kennedy) not given 1997-98

462. Graduate Seminar: Science and High Technology in the Silicon Valley, 1930-1980—(Same as 262S.)
4-5 units (Lenoir) not given 1997-98

473. Graduate Seminar: U.S. Women’s Family and Sexual History
4-5 units, Spr (Freedman)

474. Graduate Seminar: Race, Ethnicity, and Class in 20th-Century America
8-10 units, Win, Spr (Camarillo)

LATIN AMERICA

476. Graduate Seminar on Brazil
4-5 units (Wirth) not given 1997-98

478. Graduate Seminar: Economic and Social History of Latin America—Open to non-Latin Americanists working on research projects that utilize quantitative data. Acquaints students with social science approaches to Latin American history.
4-5 units (Haber) not given 1997-98

JEWISH HISTORY

485B. Graduate Research Seminar in Modern Jewish History
8-10 units, Win, Spr (Rodrigue)

MIDDLE EAST

487. Graduate Seminar: Topics in the Modern History of Egypt, Palestine, and Israel—(Same as 287S.)
4-5 units (Beinin) not given 1997-98

EAST ASIA

493A,B. Graduate Seminar: Late Traditional Chinese History
8-10 units, Win, Spr (Brook)

498,498A. Graduate Seminar: Japanese Historical Texts
8-10 units, Win, Spr (Mass)

AFFILIATED DEPARTMENT OFFERINGS

AMERICAN STUDIES

151. The Transformation of American Thought and Culture, 1865 to the Present
5 units, Win (Gillam)

214. The American 1960s: Thought, Protest, and Culture
5 units, Aut (Gillam)

CLASSICS

14N. Stanford Introductory Seminar: History of Liberal Education from Greece to Renaissance
3 units, Win (Bloomer)
101. History of Greece
4-5 units, Win (Manning)

102. Roman History I: The Republic
4-5 units, Win (Treggiari)

103. Roman History II: The Empire
4-5 units, Spr (Treggiari)

105. History and Culture of Egypt
4-5 units, Spr (Manning)

388A,B. Roman Social History
6-8 units, Win, Spr (Treggiari)

HISTORY AND PHILOSOPHY OF SCIENCE

168. History of Physics
3-5 units (Dresden) not given 1997-98

HUMANITIES

315. Graduate Seminar: The Interdisciplinary Study of the Humanities
3-5 units, Win (Robinson)

OVERSEAS STUDIES

These courses are approved for the History major and taught overseas at the campus indicated. Students should discuss with their major advisers which courses would best meet individual needs. Descriptions are in the "Overseas Studies" section of this bulletin or at the Overseas Studies office, 126 Sweet Hall.

BERLIN

129V. The History of German and European Economic Philosophy—(Same as Overseas Studies 100X.)
4-5 units, Spr (Krüger)

228V. Nationalism and Political Culture in Contemporary Germany—(Same as Overseas Studies 177B.)
4 units, Spr (Tempel)

229V. Architecture and the City, 1871-1990: Berlin as a Nucleus of Modernity—(Same as Overseas Studies 143U.)
4 units, Win (Neckenig)

FLORENCE

106V. Italy: From an Agrarian to a Post-Industrial Society
4 units, Aut (Mammarella)

215V. The Scientific Revolution: From the Renaissance to the 18th Century
4-5 units, Win (La Vergata)

233V. Italian Politics since 1989 in its International Context
4-5 units, Win (Benvenuti)

234V. Rebellion and Renewal: The Italian Renaissance
4-5 units, Aut (Biocca)

MOSCOW

121V. Russia in the Age of Nobility 1700-1840: State, Society, and Culture
5 units, Aut (Rogov)

217V. Gender and Cultural Change in Early Modern Russia—(Same as Overseas Studies 164C.)
3-5 units, Aut (Kollmann)

OXFORD

141V. European Imperialism and the Third World, 1870-1970
5 units, Spr (Darwin)

142V. From Decolonization to Democratization, 1965-1995: Britain and Africa in the Postcolonial Era
5 units, Win (Kirk-Greene)

145V. The Making of Shakespeare’s England, 1558-1640
4-5 units, Aut (Seaver)

5 units, Aut (Kirk-Greene)

240V. The Invention of the Metropolis: London, 1550-1700
5 units, Aut (Seaver)

243V. Urban History in Britain, 1500 to the 20th Century—(Same as Overseas Studies 146U.)
4-5 units, Spr (Tyack)

244V. Art and Society in Britain—(Same as Overseas Studies 221Y.)
5 units, Aut (Tyack)

PARIS

131V. Political Culture in 18th-Century France
5 units, Aut (Halevi)

PROGRAM IN HISTORY AND PHILOSOPHY OF SCIENCE

Chair: Timothy Lenoir
Committee-in-Charge: Barton Bernstein (History), Joe Corn (History), Paul David (Economics), Paula Findlen (History), Joan Fujimura (Anthropology), Peter Godfrey-Smith (Philosophy), Yair Guttmann (Philosophy), Gabrielle Hecht (History), Timothy Lenoir (History)

Professors: Barton Bernstein, David Holloway, Timothy Lenoir

Associate Professors: Paula Findlen, Joan Fujimura

Assistant Professors: Peter Godfrey-Smith, Yair Guttmann, Gabrielle Hecht

Affiliated Faculty: Hans Ulrich Gumbrecht (Comparative Literature), Henry Lowood (Stanford University Libraries), C. Francis Everitt (Hansen Lab)
The Program in History and Philosophy of Science is an interdisciplinary, non-degree program focusing on the historical and contemporary aspects of science. At its regular monthly colloquium, invited speakers from history, philosophy, anthropology, sociology, the economics of science and technology, the sciences, and medicine address topics of broad concern to science and technology studies. The program works closely with the University Libraries' Special Collections in the History of Science and cooperates with other departments and programs in the administration of undergraduate and graduate majors. Its undergraduate and graduate courses span the period from antiquity to the late 20th century. These courses can accommodate students with varying backgrounds in the natural sciences, humanities, and social sciences.

At the undergraduate level, students who wish to pursue studies in the history and philosophy of science and technology should major in the departments of History or Human Biology, with a concentration in history of science, or in the Department of Philosophy which offers a specific degree in History and Philosophy of Science. A concentration in the anthropology of science can be arranged through the Department of Anthropology. Alternatively, students may consult with a member of the Committee-in-Charge to construct an individually designed major. This major must conform to the requirements for Individually Designed Majors (see the "Individually Designed Majors" section of this bulletin). Graduate students who wish to combine studies in the history and philosophy of science and technology with majors in anthropology, history, or philosophy should consult those departments.

**COURSES**

54. Sources and Methods Seminar: Narrating Nature—American Environmental History—(Enroll in History 54S.)
   5 units, Spr (Pritchard)

60. Introduction to the History and Philosophy of Science—(Same as Philosophy 60.) Survey of 20th-century views on the nature of scientific knowledge. Logical positivism and Popper; the problem of induction; Kuhn, Feyerabend and radical philosophies of science; subsequent attempts to rebuild moderate empiricist and realist positions; case study in the history of biology. GER: 3a (DR: 8)
   5 units, Aut (Godfrey-Smith)

113. Undergraduate Colloquium: New Worlds, Imaginary Worlds—(Enroll in History 213A/313A.)
   5 units, Aut (Findlen)

115. The Emergence of Modern Medicine—(Enroll in History 13.)
   5 units, Win (Findlen)

   4 units, Spr (Findlen)

121. Technology and Culture in 19th-Century America—(Enroll in History 115.)
   4-5 units (Corn) given 1998-99


138A. Ancient Period
   4 units, not given 1997-98

138B. Cosmology: Middle Ages and the Renaissance
   4 units, not given 1997-98

138C. Modern Period: Newton to Einstein
   4 units, not given 1997-98

140. Topics in the History of Mathematics: From Antiquity to the 17th Century—(Same as Philosophy 140.) The origins and development of concepts and techniques in their social and philosophical context. Emphasis is on ancient Greek geometry, its adoption of the idea of proof and interaction with early philosophy, its application in optics and mechanics, its significance and limitations.
   4 units, not given 1997-98

145/245. The Scientific Revolution—(Enroll in History 139/339; graduate students register for 339.)
   5 units, Spr (Hart)

147/247. Undergraduate Research Seminar: Science and High-Technology in Silicon Valley, 1930-1980—(Enroll in History 262S.) The technological, political, economic, and spatial dimensions of the rise of Silicon Valley, 1930s-80s. How did Silicon Valley arise? What sustained its growth? How did it function? How did it evolve? Archival research and oral history. Focus is on radiotubes, microwave devices, semiconductors, and computers; economies of skills; university-industry relations; political dissent and the counter-culture; and the technological policies of the Cold War state. Comparison with Route 128 and other high-tech regions.
   5 units (Lenoir) not given 1997-98

152. The Darwinian Revolution—(Enroll in History 133.) Conceptual developments leading to establishment of the major unifying paradigm of biological science, the theory of evolution by natural selection. Biological thought before Darwin (1800-1836). The voyage of the Beagle and the formation of Darwin’s thought in its broader intellectual and
social context. *The Origin of Species. Descent of Man.* Difficulties the theory had to overcome and their resolution in the union of evolutionary biology and population genetics in the 1930s and 40s.

4 units (Lenoir) not given 1997-98


5 units, Win (Lenoir)

154. The Rise of Scientific Medicine—(Enroll in History 133A/333A.) Intellectual, social, and institutional dimensions of the rise of scientific medicine in the 19th and 20th centuries. How did medicine become “scientific?” What differences did science make to the practicing physician? Why did it displace other approaches to medicine? Focus is on medicine in Europe and the U.S. 1800-present. Topics: development of experimental physiology, bacteriology, pharmacology, biomedical technology, nuclear medicine, biomedical imaging, computers in medicine, and prospects for bedside gene therapies; effects of scientific developments in biomedical science and technology on medical practice and therapy; the professionalization of medicine in comparative European and American contexts.

5 units, Spr (Lenoir)

155/255. The Sociology of Scientific Knowledge—(Enroll in History 133B.) Classical problems in the sociology of knowledge as represented in the writings of Marx, Durkheim, and Mannheim. Recent work in the social construction of scientific knowledge. Emphasis is on recent studies in the historical sociology of experimental science and lab practice. Using case studies and drawing on anthropological approaches in the works of Mary Douglas, Pierre Bourdieu, and others, explores a theory of practice and a critique of historically situated practical reason as the foundation of the sociology of scientific knowledge.

4 units (Lenoir) not given 1997-98

158Q. Stanford Introductory Seminar: Virtuality—(Enroll in History 34Q.) Preference to sophomores. New media technology from the printing press and photography to computer-mediated communication have transformed our experience of the "real": our conceptions of objectivity, agency, the self, and the body. From the 17th to the 20th centuries, using authors from Hobbes to Freud, focuses on the material media's role in changing epistemological formations. Visualization in biomedicine, including new developments in "virtual surgery," hands-on construction of virtual worlds. Readings on new hypermedia guide study of emerging practices of reading and rhetoric.

5 units, Win (Lenoir)

160. Gender and Science—(Same as Anthropology 160.) Seminar examines different perspectives on the study of gender and science, including biological, medical, and physical science. Topics: the historical and contemporary construction of gender and sex, feminist critiques of scientific theories and methods, the work (and lack of work) of women in science, and debates on gendered and feminist epistemologies. GER:4c (DR:+)

5 units (Fujimura) not given 1997-98

162. Social and Cultural Studies of Biotechnology—(Same as Anthropology 162A.) Current literature in the sociocultural studies of biotechnology. Issues of concern at the intersection of biology and technology (e.g., human genome project, bioinformatics, biodiversity, virtual reality, artificial life, cyborgs and representations, and products in biology, biotechnology, and medicine). Sociocultural questioning about the organization of scientific work, the universalization and formalization of knowledge, the transformation of societies via novel products, multicultural ways of knowing, definitions of life, and ethnic and legal concerns.

5 units (Fujimura) not given 1997-98

167. Encounters with Scientific Geniuses—Scientific ability and brilliance are qualitatively different from scientific genius. Analyzes and describes the interactions and personal encounters with unquestioned geniuses. Their profound originality, incisive and often unexpected insights, and occasional naivety are relevant for the development and appreciation of science e.g., Einstein, V. Neumann, Godel, Bohr, Feynman, Schwinger, Pauli, Fermi.

3-4 units, Aut (Dresden)

168. History of Physics—Describes, analyzes, and interprets the major scientific changes characteristic of the 20th century. Introduction of the ideas of relativity, the role of quantum notions, and rapidly alternating scientific fashions from nuclear physics to particle physics, and from superconductivity to chaos. Emphasis is on corresponding changes in sociology, demography, and the impact on philosophy and the changed role of physics in the 20th century.

3-5 units (Dresden) not given 1997-98

199. Directed Reading

1-5 units (Staff)

206. History Wired—(Enroll in History 306C.) Overview, theoretical and applied, of electronic media as they relate to the various disciplines of historical research and teaching.

3 units, Aut (Chappell, Lenoir)

232. Science, Technology, and Society—(Same as Anthropology 232.) Seminar on science as social activity; recent approaches to the social production
of scientific knowledge and technologies as constructed through cultural practices and the organization of scientific work. Related issues in the studies of knowledge, culture, politics, work, and organizations.

5 units, Spr (Fujimura)

233. Feminist Theories of Science and Technology—(Same as Anthropology 246.) Feminist theories and studies of science, technology, and medicine, especially as they intersect with cultural studies of science and technology. Focuses on feminist epistemologies, and questions whether, and how, they challenge and shift the lens of current practices in science and technology. How gender is constructed by and constructs the technosciences.

5 units (Fujimura) not given 1997-98

255. The Sociology of Scientific Knowledge—(For graduate students; same as 155.)

4 units (Lenoir) not given 1997-98

269A. Workshop in the Economics of Science and Technology—(Enroll in Economics 303A.)


5 units, Win (Hart)

299. Graduate Individual Work

1-5 units (Staff)

AFFILIATED DEPARTMENT OFFERINGS

CLASSICS

139. Medicine in Ancient Greece and Rome

4 units, Win (Stephens)

GERMAN STUDIES

175/175A. Modernization, Technology, and Culture in Germany, 1900 to 1945

4 units, Win (Lowood)

HISTORY

134A. The Industrial Revolution: Historical and Cultural Perspectives

5 units (Hecht) not given 1997-98

234A. Undergraduate Colloquium: Technology in 20th-Century America and Europe

5 units, Win (Lecuyer)

234B/334A. Technology and Society

5 units (Hecht) not given 1997-98

261/361. Undergraduate/Graduate Colloquium: Nuclear Weapons and International Relations—Theories and History

5 units (Bernstein, Holloway) not given 1997-98

336A. Graduate Colloquium: Technology, Work, Culture in Comparative Perspective

4-5 units (Hecht) not given 1997-98

434A. Graduate Seminar: Topics in the History of Technology

4-5 units (Hecht) not given 1997-98

451. Graduate Seminar: 20th-Century America

8-10 units, Win, Spr (Bersstein)

MODERN THOUGHT AND LITERATURE

192. Human Technology Relations in the Late 20th Century

5 units, Spr (Weinstone)

PHILOSOPHY

164/264. Central Topics in the Philosophy of Science

4 units, Spr (Strevens)

165/265. Philosophy of Physics

4 units, not given 1997-98

167/267. Philosophy of Biology

4 units, Aut (Godfrey-Smith)

PROGRAM IN HUMAN BIOLOGY

Emeriti: (Professors) Sanford Dornbusch (Sociology), Albert H. Hastorf (Psychology), Luigi Cavalli-Sforza (Genetics)

Director: Russell D. Fernald

Professors: J. Myron Atkin (Education), Clifford Barnett (Anthropology), William Dement (Psychiatry/Behavioral Science), Carl Djerassi (Chemistry), William H. Durham (Anthropology and Human Biology), Marcus Feldman (Biological Sciences), Russell D. Fernald (Psychology, and Human Biology), H. Craig Heller (Biological Sciences), Herant Katchadourian (Psychiatry/Behavioral Sciences), Donald Kennedy (Biological Sciences), Richard Klein (Anthropology), Timothy Lenoir (History), Iris Litt (Pediatrics), Michael Marmor (Ophthalmology), Robert Sapolsky (Biological Sciences), Arthur B. Wolf (Anthropology)

Associate Professors: Laura Carstensen (Psychology), Christos Constantinou (Urology), Anne Fernald (Psychology), James Fox (Anthropology), Joan Fujimura (Anthropology), Dolores Gallagher-Thompson (Psychiatry), Gordon Matheson (Medicine), Daria Mochly-Rosen (Molecular Pharmacology), Ellen Porzig (Biology, and Human Biology), John Rick (Anthropology)

Assistant Professors: Amato J. Giaccia (Radiation Oncology), Abby King (Medicine and Health Research Policy)

Other Teaching Faculty: Donald Barr, Baruch Blumberg, Carol Boggs, Gail Butterfield, Malcolm Cohen, S. Shirley Feldman, Andrew Fell, Robert Franciscus, Hill Gates, Michael Green, William B. Hurlbut, Philip Lee, Alejandro
The Program in Human Biology is an inter-school, interdepartmental, undergraduate major. It provides an interdisciplinary perspective on the relationship between the biological and social aspects of humanity's origin, development, and prospects.

The program has three goals:
1. To provide a broad and rigorous introduction to the biological and behavioral sciences and their interrelationships.
2. To relate these sciences to the problems raised by the relationships of human beings to one another and to their environment.
3. To help each student achieve a high level of understanding of one aspect of the biological and behavioral sciences and its application.

The Human Biology curriculum draws on faculty from various University departments and schools. To complete the requirements for the major, students must take courses from the offerings of the program and from the listings of other University departments. The program culminates in an A.B. in Human Biology.

Human Biology majors are well prepared for advanced training in professional schools (for example, education, law, medicine, public policy) and graduate programs in the behavioral, natural, and social sciences, depending on their choice of upper-division courses. Undergraduates in Human Biology may enter coterminous master's degree programs in a number of other University departments.

Additional information about the major may be obtained from the program's offices.

**UNDERGRADUATE PROGRAM**

**BACHELOR OF ARTS**

The A.B. in Human Biology (HB) requires a minimum of 84 units in the major divided between four levels of courses:

1. **Fundamental Program:** at least 38 units, to include
   - Human Biology Core 30 units
   - Policy Course 3-5 units
   - Statistics 4-5 units
   - Internship (HB197) 4 units

   The Human Biology Core refers to HB 2A and 2B, 3A and 3B, and 4A and 4B. See “Required Courses” below for more information.

   Effective 1993-94, Human Biology 4B fulfills the policy requirement of the major. Other courses which satisfy the policy requirement may be obtained from the program offices. A course used to fulfill the program's policy requirement may not be used in the student's foundation or area of concentration or as one of the three required upper-division courses.

   Statistics may be selected from: Statistics 60 or 190, Psychology 10, Economics 80, or Biological Sciences 141.

   The core, the policy course, and a statistics course must be taken for a grade by majors.

   The internship requirement, an independent field experience project, is graded Satisfactory/No Credit only.

2. **Foundation Courses:** 20-unit minimum. Total units vary, depending on the focus of study selected by the student for the area of concentration. They may include practicums, labs, and introductory-level courses from across the University. A maximum of 10 pre-med units (from the chemistry, physics and calculus series, and biology lab courses) and 4 research units are allowed.

3. **Area of Concentration:** a minimum of five courses totaling at least 20 units. This in-depth area of study enables the student to focus on educational and post-baccalaureate goals. Courses must be numbered 100 or above. All but one course in the concentration must be listed by, or cross-listed with, other University departments, and three or more departments must be represented in the concentration. Each course must be taken for a minimum of 3 units. Final approval of the concentration rests with the student advisers and faculty adviser. All area of concentration courses must be taken for a grade. Examples of numerous possible areas of concentration are available in the Human Biology Student Handbook.

4. **Upper-Division Courses:** students must take three Human Biology upper-division courses numbered 100 to 189. Students are expected to enroll in courses outside of the area of concentration for breadth. Lab courses cannot be used to fulfill the upper-division requirement. One upper-division course may be taken Satisfactory/No Credit. Each course must be taken for a minimum of 3 units. All non-laboratory advanced courses (those numbered 100 to 189) fulfill the Human Biology upper-division requirement, including those that say "enroll in" another department.

A prospective major must consult with the student advisers to obtain detailed information about the program and guidance in the development of an individual course of study. At the time the major is declared, the student must submit a brief written statement of academic and long-term goals and a proposed roster of courses satisfying the requirements for the major. The proposal is reviewed by
the student advisers who then help select an appropriate faculty adviser. Final approval of the proposed course of study rests with the faculty adviser. Beginning in 1997-98, there are three upper-division tracks offered within the program: Health Policy (coordinated by Donald Barr), Human Health and Performance (coordinated by Gail Butterfield), and Environmental Policy (coordinated by Armin Rosencranz). Students with interests in these programs should contact the coordinator.

Students who plan to pursue graduate work should be aware of admission requirements of the schools to which they intend to apply. Early planning is advisable to guarantee completion of major and graduate school requirements.

MINORS

A minor in Human Biology is intended to provide an introductory background to the relationship between the biological and social aspects of humanity’s origin, development, and prospects. Many of the major problems facing human civilization today involve both biological and social aspects. Scientific approaches to these problems are essential, but they must be broadly conceived, integrating what we know of the biological with an understanding of the social and cultural setting in which they exist. Students with a minor in Human Biology will have a strong background in the integration between biological and social aspects of humans.

The minor in Human Biology consists of the core curriculum (Human Biology 2A, 2B, 3A, 3B, 4A, and 4B) and one additional upper-division course (for example, any course offering by Human Biology with a number over 100, including courses cross-listed with other departments or programs). These must be taken for a grade of ‘C’ or better. Courses that count towards the fulfillment of major requirements are not counted towards the minor.

Students declaring a minor in Human Biology must do so no later than two quarters prior to their intended quarter of degree conferral (for example, a student must declare a minor before the end of the Autumn Quarter to graduate the following Spring Quarter).

HONORS PROGRAM

The honors program in Human Biology affords qualified majors the opportunity to work closely with faculty on an individual research project culminating in an honors thesis. Students may begin honors research from a number of starting points including: topics introduced in the core or upper-division courses, independent interests stemming from an internship experience, or collaborating with faculty from the natural, social, or behavioral sciences. Students may apply to the honors program once they have completed the human biology core, have an overall Stanford grade point average (GPA) of 3.0, and meet other requirements detailed in the Honors Handbook. Interested students should consult resources in the Human Biology office including the Human Biology Honors Handbook, the honors program application available from the student services office, and appointments during office hours with Human Biology honors chair.

Specific courses of interest to honors students include: 190 (Honors Seminar for Sophomores), 191 (Honors Seminar for Juniors), 192 (Honors Seminar for Seniors), 193 (Research in Human Biology), and 194 (Honors). Most honors projects involve a total of 10 to 15 units of course work in 193 and 194.

Admission to the honors program is by application, normally in the junior year (and no later than the first Friday in December of the senior year). Students planning to conduct honors research are encouraged to attend the Honors Seminar for Juniors (191) and to begin research or preparation during their junior year. An Honors College is held for a select number of senior honor students just prior to Autumn Quarter each year. For applications, contact the program office. The honors thesis is normally completed by the middle of Spring Quarter of the senior year. Each honors student then presents a brief summary of honors research at the Human Biology Honors Symposium in May.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

(AU) indicates that the course is subject to the University Activity Unit limitations (8 units maximum).

The faculty and staff of Human Biology prepare a student handbook, available in the Student Adviser’s office in Building 80, which provides a detailed description of the Human Biology major and outlines possible areas of concentration. Because the handbook is published over the summer, it reflects the most up-to-date information for the academic year, and is the definitive guide for all Human Biology majors.

REQUIRED CORE

Required Core sequences (2A and 2B, 3A and 3B, and 4A and 4B) introduce the biological and social sciences, and most importantly, relationships between the two. Classes meet throughout the academic year. Students must register concurrently for the A and B series and take the core in sequence. Students should initiate the core in Autumn Quarter of the sophomore year. Any deviation from the core sequence must first be approved by the program chair through a petition
process. Freshmen are not permitted to enroll. Majors must take core courses for a letter grade.

2A,B. Genetics, Evolution, and Ecology: Culture, Evolution, and Society—2A: introduction to the basic principles of classical and modern genetics, evolutionary theory, and population biology. Topics: micro- and macro-evolution, population and molecular genetics, population dynamics, and community ecology, emphasizing the genetics of the evolutionary process and applications to human populations. 2B: introduction to the evolutionary study of human diversity. Hominid evolution, the origins of social complexity, social theory, and the emergence of the modern world system, emphasizing the concept of culture and its influence on human differences.

2A. Genetics, Evolution, and Ecology—GER: 2a (DR:5) 5 units, Aut (Boggs)

2B. Culture, Evolution, and Society—GER: 3b (DR:9) 5 units, Aut (Klein)


3A. Cell and Developmental Biology—GER: 2a (DR:5) 5 units, Win (Mochly-Rosen, Porzig)

3B. The Human Life Cycle—GER: 3b (DR:9) 5 units, Win (A. Femald, Katchadourian)

4A,B. The Human Organism: The Human Predicament—4A: organ system physiology, beginning with the basic principles of neurobiology and endocrinology, and the functions of body organs. The mechanisms of control, regulation, and integration of organ systems function. 4B: the relation of the biological sciences to public policy in resource management and conservation practices, the regulation of environmental and health risks, agricultural production, the delivery of health services, the protection of biodiversity, and global climate change. Assigned policy challenges in lectures and section meetings. Reading on actual cases.

4A. The Human Organism—GER: 2a (DR:5) 5 units, Spr (R. Fernald, Heller)

4B. The Human Predicament—GER: 3b (DR:9) (WIM) 5 units, Spr (Kennedy)

ADDITIONAL INTRODUCTORY OFFERINGS

2S,3S,4S. Bioethical Issues in Human Biology—Perspectives on moral, ethical, and religious issues associated with advances in the biological sciences and their impact on human life. Guest speakers with discussion format.

1-2 units, Aut, Win, Spr (Hurlbut)

3X. Practicum in Young Child and Family Development—Practicum experience at Children’s Health Council for 3.5 hours/week. Must be taken concurrently or subsequent to 3B. Enrollment limited to 35. (AU)

1 unit, Win, Spr (Staff)

3Y. Practicum in Daycare and the Young Child—Practicum experience at Stanford Daycare Centers for 3.5 hours/week. Must be taken concurrently or subsequent to 3B. Enrollment limited to 10. (AU)

1 unit, Win (Staff)

6. Human Origins—(Enroll in Anthropology 6.) GER: 2a (DR:5) 5 units, Win (Klein)


11. Sleep and Dreams—Multimedia lecture/survey format providing a background of current information and research on how sleep affects our daily life. Topics: physiology of non-REM and REM sleep, daytime sleepiness and performance, circadian rhythms, dreaming (i.e., content, psychophysiological correlates, lucidity, etc.), sleep disorders (insomnia, narcolepsy, sleep apnea, sleepwalking), jet lag, sleeping pills, sleep and mental illness, sleep deprivation, developmental and phylogenetic aspects, sleep and memory, etc.

3 units, Win (Dement)

12. The Nature of Health—The concept of health from a sociologic perspective. Ways to define and measure health, and how social factors (education, standard of living, race, and ethnicity) can affect the health of an individual, a community, or a nation. Personal behavior as a determinant of health within this context. Lectures, student presentations, and discussions.

3 units, Spr (Barr)

13. The Emergence of Modern Medicine—(Enroll in History 13.) 5 units, Win (Findlen)
Recent conceptions of guilt based on evolutionary
in-fiction is not Science Fiction

34. Body Traps: Perspectives on Body Image—
The complex and multidimensional factors that
contribute to the development of body image and
eating disorders. Topics: body image and media,
beauty and disgust as agents of evolution, body image
in a historical context, development, disability,
the stigmatization of fat and aging, eating disor-
ders (causes, consequences, and treatment), obesity,
and body image from a cross-cultural perspective.
Enrollment limited to 25.

2 units, Spr (Marmor)

60. Colloquium on Population Studies—(Enroll
in Biology 146.) Preference to sophomores.

1 unit, Win (M. Feldman)

STANFORD
INTRODUCTORY SEMINARS

90Q. Stanford Introductory Seminar: Contemporary Issues in Human Experimentation—
Preference to sophomores. Issues in using humans
for experimentation in medical research. Principles
of protection of subjects, process of obtaining
informed consent, organization of protocols,
evaluation of experimental design and scientific
merit. Ethical/legal issues involving human sub-
jects in terms of confidentiality, recruitment, and
conflict of interest. Legislation addressing inade-
quate numbers of women and minorities in re-
search projects. Focus is on research with the
cognitively impaired, prisoners, and barriers to
obtaining informed consent in issues of age, lan-
guage, and factors that may affect the ability
to give truly informed consent.

3 units, Aut (Constantinou)

91Q. Stanford Introductory Seminar: Studies of
Animal Behavior—(Enroll in Psychology 19Q.)
Preference to sophomores.

3 units, Aut (R. Fernald)

95Q. Stanford Introductory Dialogue: Science-
in-fiction is not Science Fiction—(Enroll in Chem-
istry 25Q.) Preference to sophomores.

2 units, Win (Djerassi)

96Q. Stanford Introductory Seminar: Multidis-
ciplinary Perspectives on Guilt—Preference to
sophomores. Concepts and experiences of guilt and
shame from multidisciplinary perspectives. The
conceptual and historical roots of our ideas of guilt
and shame from the perspectives of major religious
traditions (Judaism, Buddhism, and Christianity).
Recent conceptions of guilt based on evolutionary
theory and the social sciences. The experience of
guilt at the individual level. The development of the
sense of guilt in childhood, the manifestations of
guilt in interpersonal relationships, the psychopa-

thology of guilt, and cross-cultural differences in
the experience of guilt.

4 units, Win (Katchadourian)

97Q. Stanford Introductory Seminar: Critical
Insights in Sports Medicine—Preference to soph-
omores. Discussions on readings on 8-10 topics
in sports medicine. One student each week selects a
topic and presents it in class. Guest speakers occa-
sonally invited.

3 units, Win (Matheson)

ADVANCED

Open to non-majors with the proper prerequi-
sites. Human Biology majors have preference
when enrollment is restricted. All classes listed
here fulfill the Human Biology upper-division
requirement, including those that say "enroll in"
another department.

101. The Human Hand: Evolution, Ontogeny,
and Influence—The structure and function of the
human hand from evolutionary, developmental,
and cultural perspectives. Topics: the evolution of the
five digit limb pattern, homology and analogy in
vertebrate limb patterns, variation in human hand
patterns and their proposed developmental, mecha-
nisms, models of hand use, the evolution of true
opposability, archaeology of tool manufacture and
implementation, cultural perspectives on the signif-
cance of the hand in gesture, sign language, math-
ematics (base ten), music, writing, symbolism, in-
strumentation, and art. Enrollment limited to 15.
Prerequisites: Human Biology core or consent of
instructor.

3 units (Porzig) not given 1997-98

103. Women, Fertility, and Work: The Biology/
Culture Debate about Gender—Seminar on wom-
en's efforts to bear and rear young children while
contributing to familial and community production.
How women and men share and balance these
aspects of social reproduction in diverse societies.
Theoretical approaches to the connection between
biology and culture are tested, emphasizing interac-
tional effects. The limits of theories of the cultural
construction of femaleness, connections between
gender and political economy, and how these cul-
tures differently envision individual and collective
responsibilities in women's work and childcare.

5 units (Gates) not given 1997-98

105. Ethnogerontology: Aging and Ethnicity—
(Same as Education 108X.) Key sociocultural as-
pects of aging process; issues involved in assess-
ment and treatment of mental and physical health
problems of identified ethnic groups. Guest lectures
by Asian American, Hispanic American, and Afri-
can American experts in ethnogerontology. Sup-
ervised fieldwork with elders of various cultural and
ethnic backgrounds.

4 units (Edmonds, Gallagher-Thompson, Yeo)
not given 1997-98
107. Astrobiology and Space Exploration—Evolution cast against space and time, and focusing on the emergence of life, intelligence, and civilization on Earth and, possibly, elsewhere. The phenomenon of human space exploration and the biological, psychological, sociological, and ultimately, philosophical issues that emerge. Integrates information from astrophysics, biochemistry, chemistry, evolutionary biology, geology, paleontology, physiology, psychology, and sociology. Taught by scientists from NASA Ames Research Center. Enrollment limited to 30. Prerequisites: one year college physics, chemistry, biology or psychology.

3 units, Spr (Cohen)

108. Health Psychology and the Campus Culture—(Enroll in Psychology 190.)

3 units, Aut, Spr (Martinez, Pertofsky)

109. Human Behavioral Biology—(Enroll in Biology 150/250.)

6 units, Spr (Sapolsky) alternate years, not given 1998-99

110. Vertebrate Biology—The evolution, form, function, and behavior of the vertebrates, from primitive fishes to birds and mammals, including humans. Prerequisite: Biology or Human Biology core.

3-4 units (Porzig) not given 1997-98

110L. Vertebrate Biology Lab—Comparative anatomy structure of the vertebrates with emphasis on osteology. Representatives of each of the seven vertebrate classes are available in lab. Three hours per week plus review labs and field trips. Prerequisites: current or previous enrollment in 110.

3 units (Porzig) not given 1997-98

111. Human Physiology—(Enroll in Biology 112.)

4 units, Win (Heller, Harris)

115A. Humans and Viruses—Overview of human virology. Topics illustrate important concepts in biology and the social sciences, focusing on emerging infections, viral classification, transmission and prevention, vaccination and treatment, eradication of disease, viral patogenesis, mechanisms of virally-induced cancer, and viral evolution. Topics: molecular biology of genetic shift and drift in influenza virus, cellular tropism of HIV, development biology of virally-induced birth defects, clinical aspects of infantile diarrhea, social aspects of the common cold, policy issues of blood antibody tests, factors in patogenesis and transmission of prions. Prerequisites: Human Biology core or consent of instructor.

6 units, Win (Siegel)

115B. Seminar: The Vaccine Revolution—Advanced seminar: human aspects of viral disease, focusing on recent discoveries, especially in the area of vaccine development and emerging infections. Journal club format: students select articles from primary scientific literature, write formal summaries, and synthesize into a literature review on a specific topic. Emphasis is on development of critical reading, analysis, experimental design, and interpretation of data. Students give four oral presentations and lead discussions based on their scientific journal reading. Enrollment limited to 10. Prerequisites: 115A, consent of instructor.

5 units, Spr (Siegel)

116. Eye and Implications of Vision—The basic physiology of vision and how visual capabilities influence human endeavors. Topics: mechanisms of vision, vision in animals, illusions, visual physiology of art, the eye in history and literature, vision in sports. Lectures/seminar format with student participation, oral presentations, and a written thesis. Prerequisites: interest in mechanisms of vision and the humanities.

3 units, Win (Marmor)

117. Policy and Research in Science Education—Controversial topics in science education (e.g., teaching of evolution, national standards and tests, gender bias, text selection, recruiting and retaining qualified teachers, goals of science teaching for different populations). The substance and style of formulating policy for science education in the U.S., now and in the recent past. Issues for local, state, and federal authorities; appropriate government roles in selection of content, improvement of teaching, and research. Primary, secondary, and undergraduate programs; and the use of museums and media in programs to improve science education. International comparisons where appropriate. Enrollment limited to 20.

4 units, Win (Atkin)

118. Human Diversity: A Linguistic Perspective—The diversity and distribution of human language and its implications for the origin and evolution of the human species. The origin of existing languages and the people who speak them. Where did the languages that we currently see in the world come from and how can this diversity be used to study human prehistory? Evidence from related fields (archaeology and human genetics). Topics: the origin of the Indo-European languages, the peopling of the Americas, and the evidence that all human languages share a common origin.

3 units (Ruhlen) not given 1997-98

119. Conservation Biology—Introduction to the science of preserving biological diversity, its principles, policy, and application. Topics: biology of small populations, extinction, minimum viable population analysis, habitat fragmentation, reserve design and management, the Endangered Species Act, and conflict mediation. Case studies and local field trips illustrate topics. Prerequisite: 2A, Biology 33, or consent of instructor.

4 units, Win (Boggs, Launer)

120. Human Nutrition—Introduction to human nutrition including the function, digestion, absorp-
121. Ethical Issues in the Neurosciences—Multi-disciplinary approach to ethical questions raised by recent advances in the neurosciences. How these advances relate to medical therapy, social policy, and broader considerations of human nature (consciousness, free will, personal identity, and moral responsibility). Discussion format with leading research scientists, legal experts, philosophers, and theologians. Topics: neurogenetics, fetal brain tissue therapy, medicalization of criminal behavior, cosmetic psychopharmacology, and the neurobiological basis of love, sexuality, and gender. Enrollment limited to 15. Prerequisites: Human Biology core, Biology core, or consent of the instructor.

4-5 units, Spr (Hurlbut)

124. Neural Basis of Sleep and Circadian Rhythms—(Enroll in Biology 149.)

4 units (Edgar, Heller) not given 1997-98

125. Environmental Policy and Law—The role of government and citizens in formulating, implementing, and enforcing environmental policy. Using case studies, background readings, law cases and statutes, seminar investigates the formal and informal political mechanisms involved in controlling pollution, and protecting the environment. Topics: the respective roles of courts, legislatures, executive agencies, and nongovernmental organizations in shaping U.S. environmental policy. Pros and cons of regulatory and economic approaches to pollution control; environmental politics and ethics; air and water pollution; environmental justice; toxic substances and risk assessment; economics and trade.

5 units, Spr (Rosencreanz)


4 units, Aut (S. Feldman)

127A,B. Research Seminar on Adolescence—Small groups of students jointly design, conduct, analyze and write up a piece of original research. Teaches undergraduates research-related skills, particularly suited for juniors preparing to undertake Honors in their senior year. 127A: students conduct computer-based literature searches, design or locate suitable instruments to assess constructs of interest, submit a Human Subjects protocol, collect data from adolescents, code data, and enter it on the computer. 127B: students analyze data using computer-based statistical packages (SPSS), applying the statistics they have learned in their introductory courses, design graphs of major findings, interpret and write up the research project in APA format; five oral presentations to the class on the findings of their study. Enrollment limited to 12. Prerequisites: 126, Psychology 10 or equivalent.

127A. 3 units, Aut (Feldman, Cauffman)
127B. 2 units, Win (Feldman, Cauffman)

128. The Human Gamete and Pre-Embryo—Cultural, biological, medical, and social aspects of human gametogenesis and the earliest stages of human development. Topics: assisted reproductive technologies (including in vitro fertilization), historical and cultural perspectives on male and female gametes, pre-implantation genetic testing and the critical analysis of current biological and medical research on gametogenesis. Writing-based seminar. Enrollment limited to 12. Prerequisites: Human Biology core or consent of instructor.

3 units, Win (Porzig)

129A. Controversies in Human Nutrition—Seminar on human nutrition. Exposure to statistics and experimental design. One hour oral presentations on subjects of students' choice, emphasizing critical reading of original scientific research. Summary paper required. Prerequisites: 120, consent of instructor.

3 units (Butterfield) not given 1997-98

129B. Controversies in Sports Nutrition—In-depth investigation of controversial issues in sports nutrition. Lectures, student presentations on controversial issues. Students evaluate original scientific literature and read material pertinent to each controversy to participate knowledgeably in the discussion. Prerequisites: 120 and 159, or consent of instructor.

3 units, Win (Butterfield)

130. Adam 2000: Images of Human Life in the Age of Biomedical Technology—Interdisciplinary approach to the social, moral, and aesthetic values which guide the use of biomedical technology. How advances in biology are reshaping our relationship with nature, attitudes toward the body, and ideas about the meaning and purpose of human life. Topics: use of medical technology to alter appearance and enhance performance, fetal tissue transplantation, biotherapy for criminal behavior, treatment of aging as a disease, and alteration of the body for space travel. Lecture/discussion format with distinguished guests from the scientific and religious communities. Limited enrollment. Prerequisites: Human Biology or Biology core, or consent of the instructor.

4 units, Win (Hurlbut)
131. Natural Resources Policy and Law—Focuses on federal public land and natural resources policy; mining, timber, and grazing law and policy; legal aspects of forest, range, park, wilderness, wetlands, and wildlife management; recreation and preservation; and related issues. The role of the courts, administrative discretion, the Endangered Species Act, and the tension between protecting resources and respecting property rights. Students research one aspect of law and policy governing the management of natural resources.

5 units, Win (Rosenzcranz)

132. Human Ecology: Oceania and East Asia—Human/environmental interactions in two contrasting world regions: continental E. Asia (including Korea and Japan) and insular Oceania. Prehistoric, colonial, and contemporary effects of human action in terms of sustainability, intensification, and biodiversity under differing cultural regimes. Emerging ecological dilemmas and solutions in contemporary societies with different structures, resources, and degrees of global integration.

4 units (Gates) not given 1997-98

134. Ecological Anthropology—(Same as Anthropology 164.) The relationship between human populations and their environments. How environment influences human behavior and culture, and how human populations shape the environment. Classical approaches within the field: cultural ecology, systems theory, optimization theory, evolutionary ecology, and population dynamics. Current research on indigenous systems of resource management, common property resources, and political ecology. GER:2a (DR:S)

3-5 units (Durham) not given 1997-98

135. Global Environmental Policy—Advanced seminar on the international management of regional and global environmental issues, focusing on the issues themselves, and on the international institutions and agreements created to manage them. The need for international environmental law, its sources, and the participants in its creation and implementation. What works in international environmental management and what does not. Topics: ozone depletion, global warming, forests, transboundary and marine waters, Antarctica, endangered species, biodiversity, plant genetic resources, trade and the environment, and the rights of indigenous people. The future of international environmental policy and law, the attempt to identify potential difficulties, and their possible resolutions. Enrollment limited to 20.

5 units, Aut (Rosencrancz)

138. Introduction to Parasitology—Overview of parasitology, emphasizing protozoa and helminths (worms) of medical and veterinary importance. Examples illustrate themes of host/parasite interaction, from the basic biology of parasites to the interactions between parasites, people, and communities. Enrollment limited to 20. Prerequisites: Human Biology or Biology core, or consent of instructor.

3 units, Aut (Fell)

139. Primate Societies—(Enroll in Anthropology 139.)

5 units, Spr (Maggioncalda)

140. Biopsychosocial Aspects of Sports—Seminar of the world of sport and athletic competition. Multi-disciplinary approach. Topics: athletic injury, retirement, competitive and performance stress, coach-athlete dynamics, life as an elite athlete, child development and sport, drug abuse, doping control, eating disorders, post-traumatic stress disorder and boundary violation, cognitive-behavioral aspects of performance enhancement and peak experience. Writing and research intensive. Understanding of the fundamentals of research design is expected as a paper/project, which includes elements of original field research. Limited enrollment. Prerequisite: Psychology 10 or equivalent.

3 units, Spr (Shuer)

142. The Impact of AIDS—Focuses on HIV, particularly disease pathology and spread of the virus, providing a solid foundation for understanding the impact of HIV on biology, medicine, and society. Biology, clinical features, cultural aspects, and intervention/prevention. Provides tools for thinking of ways to stop the transmission of HIV, emphasizing education and health policy. Cultural aspects of HIV, including perspectives from sociology, law, economics, ethics, and politics. Students use their knowledge to complete a service learning project such as teaching high school students about HIV as part of a student speaker bureau. Extensive use of guest speakers and experts on HIV.

5 units (Siegel) not given 1997-98

143. Corporate Responsibility in our Local and Global Environment—Provides a forum to research and discuss corporate responsibility in our local and global society. The roles that corporations hold in our local and global environment (natural and working/living), economy, culture and community, and the health impact of the products and wastes generated.

4 units, Win (Rosencrancz)

145. Sustainable Development in Indigenous Communities: Case Studies—The prospects for achieving the dual goals of conservation and sustainable development in indigenous communities. The interactions between poverty, development, and environmental degradation. Four case studies: the Maxas from Quintana Roo, the Mixes from Oaxaca, the Huichols from Nayarit and Jalisco, and the Seris from Sonora. Lectures, class discussions, case study analysis, and multimedia presentations. Prerequisites: Human Biology Core or equivalent.

3 units, Aut (Durham, Zaidenweber)
146. Perspectives on Sustainable Development in Latin America—(Enroll in Latin American Studies 195.)
3 units, Win (Rosset)

148. Environmental Policy—Important environmental issues of today and the future, how to deal with them politically, and how to resolve conflicts between environmental concerns and other social needs. Focuses on the U.S.; international perspective when appropriate. Definition and description of environmental and governmental impact, history of human impact on environment, causes of increased human impact, history of environmental protection, decision making and resolution of issues, future environmental issues. Two discussion hours. Enrollment limited to 15. Prerequisites: Human Biology core, or consent of instructor.
3 units (A. Ehrlich) not given 1997-98

149. Indigenous Peoples and Environmental Problems—Upper-division undergraduate. The human consequences of contemporary environmental problems. The impact of market economies, “development” efforts, and conservation programs on indigenous peoples with reference to the Amazon, E. Africa, Alaska, and Central America. The role of indigenous grassroots organizations in combating environmental destruction and degradation of homeland areas.
3-5 units, Spr (Staff)

150. Gender-Specific Perspectives on Birth Control—In most societies human fertility control responsibility rests predominantly with women. Is this desirable and realistic, or should changes be instituted? Groups of four to five students of diverse backgrounds and different professional interests (medicine, law, economics, religion, sociology, political science) develop a series of position papers dealing with new birth control procedures suitable for populations of different cultural and socioeconomic backgrounds with gender-specific considerations. Part I: lectures, selecting population groups and multi-disciplinary task forces, and individual discussions with each task force. Part II: library and field work, writing task force reports, and oral presentations. Limited to 20 seniors; junior standing considered in exceptional circumstances. GER:4c (Dr.;†)
5 units (Djerassi) not given 1997-98

151. The Rise of Scientific Medicine—(Enroll in History 133A.)
3 units, Spr (Lenoir)

152. The Biology and Culture of Psychoactive Drugs—The neurochemistry of alcohol, cocaine, nicotine, marijuana, caffeine, and other drugs. The basic biology of how psychoactive chemicals affect the brain is discussed as a means of measuring changes in brain activity to the subjective, psychological effects of each class of psychoactive drug. Insights from these investigations are applied to understanding the social, cultural, economic, and political factors that have influenced substance use in the U.S. Prerequisites: basic understanding of the nervous system; at least one of 4A, Biology 32, Psychology 70; or consent of instructor.
3-4 units (O'Hara, Lenox) not given 1997-98

154. Biosocial Aspects of Cancer—Recent advances in the biology, diagnosis, and treatment of cancer. The social and economic ramifications of being diagnosed and treated for cancer. What are the present options for cancer treatment and what new technologies may change these options in the future? New diagnostic techniques for early detection of cancer. The use of predictive assays to determine the most effective treatment modality—chemotherapy, radiotherapy, surgery, hyperthermia, immunotherapy, etc.
4 units, Spr (Giaccia)

155. Undergraduate Seminar: Selected Topics in Sleep Research and Sleep Disorders Medicine—Topics decided by the students and instructor, taken from current research in the areas of basic sleep and dream research, and sleep disorders medicine. Guest lectures by scientists in the field. Discussions on current research. Students find and critique data from predominantly scientific journals, culminating in a formal presentation. Enrollment limited to 12. Prerequisites: 11, consent of instructor.
5 units (Dement) not given 1997-98

156. Human Development—Biological, medical, and social aspects of normal and abnormal human development. Topics: in vitro fertilization and embryo transfer; gene and cell therapy; gametogenesis; pattern formation in nervous system and limb development; gene activity in early development; cell recognition at fertilization; twinning and grand multiple pregnancies; prematurity, in utero effects of teratogens; sex determination and differentiation; growth control; gigantism and dwarfism; neural tube defects; cardiac morpogenesis; progress in the developmental biology of humans. Three hours of lectures plus one hour required discussion section per week. Limited enrollment. Prerequisites: Human Biology or Biology core, or consent of instructor.
3-4 units, Spr (Porzig)

157. Biological Basis of Behavior—The neural and hormonal basis of animal behavior studied to understand the basis of behavioral patterns. Multidisciplinary analysis of the ecological and physiological constraints which have governed specific adaptations in animal systems.
3 units (R. Fernald) not given 1997-98

158. Epidemics, Evolution, and Ethics—Humans differ in their susceptibility to disease as a result of genetic susceptibility, environmental disease caus-
ing agents, physiology, and behavior. Populations living in different environments and cultures may differ from each other in their response to disease hazards. The pathogenesis of specific infectious and other agents (hepatitis, retroviruses, cholera vibrio, environmental carcinogens, industrial toxins, etc.), and the history of epidemics and endemics (influenza, tuberculosis, malaria, etc.) in relation to human evolution. Treatment and prevention of these illnesses generate a range of ethical problems, even more relevant as the Human Genome Program progresses and the discoveries in biology and medicine are applied to medicine and public health.

4 units, Aut (Blumberg, Hurlbut)

159. Sports Medicine—(Same as Medicine 260.) For medical students and upper-division Human Biology undergraduates. Integrated physiological responses to the elevated metabolic demands of exercise; acute responses and training adaptations. Topics: the neuromuscular system, energy metabolism, cardiopulmonary system, endocrine system, nutrition and biomechanics. The application of physiological principles to specific situations and populations. Topics: training principles, measurement of exercise capacity, nutrition and performance, environmental extremes of human performance, exercise and children, exercise and aging, women's issues, fitness and health, prescribing exercise, overtraining and immunity, drugs in sport, and musculoskeletal injuries. Prerequisite: medical school enrollment or upper-division Human Biology standing or consent of instructor.

4 units, Win (Matheson)

160. Health Care in America—Overview of the health care system in the U.S., examining several key organizations and institutions that shape health policy and health care delivery. By understanding the forces that affect health and health care, students assess more critically options for health care reform.

3 units, Aut (Barr)

160A. Seminar in American Health Policy—Key issues surrounding health care reform, and the policy making process as it pertains to health care. Student presentations of assigned readings followed by discussion. Prerequisite: Human Biology 160 and consent of instructor.

3 units, Spr (Barr)

160B. Senior Honors Colloquium in Health Policy—Open to seniors admitted to the honors program, by consent of instructor. Assists students doing honors research pertaining to health policy. Weekly discussion centers around students presentations of honors projects, the policy issues involved, and the structure of the proposed research.

1 unit, Aut (Barr, Lee)

161. Darwin, Evolution, and Galapagos—(Same as Anthropology 193.) Advanced seminar on the flora and fauna of the Galapagos Islands and what they reveal about pattern and process in organic evolution. Darwin’s observations in the Galapagos, and their role on the formulation of his theory of evolution. Implications of recent research in the Galapagos for understanding evolutionary dynamics. Lectures, discussion, and optional field trip to the Galapagos Islands (at extra expense, limited capacity). Enrollment limited to 25. Prerequisites: Human Biology core or consent of instructor.

5 units (Durham) not given 1997-98

164. Social and Cultural Studies of Biotechnology—(Enroll in Anthropology 162A.)

5 units (Fujimura) not given 1997-98

165A. Disease, Health, and Culture Change—Outbreaks of disease and health as casual factors in the shaping of human cultures. Humans buffer themselves against the consequences of ill health through their capacities for storing and transmitting knowledge, and for dividing the labor of subsistence in flexible ways. The complexity of cultures renders them vulnerable under biologically stressful conditions as individuals or groups with special knowledge and skills die or become incapacitated. Cultural changes are examined to access the significance of disease and health as factors in cultural processes. Class, ethnic, and sex/gender differences as they affect disease-induced culture change.

4 units (Gates) not given 1997-98

166. Cardiovascular Disease Epidemiology and Prevention—Epidemiological, biological, and behavioral perspectives of cardiovascular disease and assessment and modification of risk factors relating to it. The potential for disease prevention in the context of major preventive trials. Public policy ramifications. Topics: diet, weight control, smoking, Type-A behavior, and exercise. Enrollment limited to 40. Prerequisites: Human Biology core or consent of instructor.

4 units (King) not given 1997-98

167. International Health—Introduction to concepts of health and wellness and the major descriptors and determinants of health status, international organizations and control programs, specific disease-related problems within particular population groups from an epidemiologic viewpoint, examples of health care delivery methods, analysis of efforts to improve health through examination of specific programs and projects currently underway and previously implemented. Emphasis is on the cultural, economic, and political context in which all questions/issues in international health exist. Prerequisites: Human Biology core or consent of instructor.

3 units, Spr (K. Smith)

168. Medical Anthropology—(Enroll in Anthropology 168.)

5 units, Aut (Barnett)
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Instructor</th>
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<td>170</td>
<td>Gender and Science—(Enroll in Anthropology 160.)</td>
<td>5</td>
<td>Fujimura</td>
<td>not given 1997-98</td>
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<td>172</td>
<td>The Biology and Evolution of Language—(Enroll in Anthropology 5.)</td>
<td>4-5</td>
<td>Fox</td>
<td>not given 1997-98</td>
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<td>173</td>
<td>Medical Ethics—(Enroll in Philosophy 78.)</td>
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<td>175</td>
<td>Virtual Vertebrates—Computer simulations of the biomechanics of aquatic locomotion in vertebrates such as fishes and cetaceans. Development and testing of educational software on the anatomy, physiology, and biomechanics of swimming vertebrates. Possible organisms: lungfish, eels, lamprey, tuna, sharks, rays, turtles, penguins, dolphins. Estimation and resolution of the biomechanical forces affecting lift, thrust, and drag. Computer laboratory-based weekly meetings. Enrollment limited to 10. Prerequisites: 110, consent of instructor.</td>
<td>3</td>
<td>Porzig</td>
<td>not given 1997-98</td>
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<td>176</td>
<td>Incas and their Ancestors: Peruvian Archaeology—(Enroll in Anthropology 189.)</td>
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<td>177</td>
<td>Genes, Peoples, and Languages—Human origins, migrations and diversity. Modern genetics, beyond the borders of recorded history. Human evolution, ancestral languages, and the spread of civilizations. Topics: paleontology and human origins, mapping evolution from mitochondrial and nuclear DNA, ethics of collecting and using genetic material from indigenous peoples, genetic engineering, eugenics and the future of human evolution. Prerequisites: Human Biology or Biology core, or consent of instructor.</td>
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<td>178</td>
<td>Aging: From Biology to Social Policy—(Enroll in Anthropology 140.)</td>
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<td>179</td>
<td>Advanced Neurosciences Laboratory—(Enroll in Biology 209.)</td>
<td>4</td>
<td>Heller, Grahn</td>
<td>not given 1997-98</td>
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<tr>
<td>180B</td>
<td>Beginning Human Osteology—(Enroll in Anthropology 180B.)</td>
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<td>180C</td>
<td>Advanced Human Osteology—(Enroll in Anthropology 180C.)</td>
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<td>181</td>
<td>Evolutionary Anthropology—(Same as Anthropology 181/281.) Upper-division/graduate seminar focused on the concept of evolution as used in anthropology. Evolutionary theory in biological anthropology, as applied to hominid evolution and human population genetics. Evolutionary approaches to culture and social organization, including social evolution, sociobiology, and evolutionary culture theory. Enrollment limited to 20.</td>
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<td>182</td>
<td>Hunter-Gatherers in Archaeological Perspective—(Enroll in Anthropology 187.)</td>
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<tr>
<td>183</td>
<td>The Darwinian Revolution—(Enroll in History 133.)</td>
<td>4</td>
<td>Lenoir</td>
<td>not given 1997-98</td>
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<tr>
<td>188</td>
<td>The Origins of Modern Humans—(Enroll in Anthropology 194.)</td>
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HONORS, INTERNSHIP, AND SPECIAL PROJECTS

190. Honors Seminar for Sophomores—Introduction to the process of doing honors research and writing the final thesis. Guest speakers discuss various aspects of honors research. Students attend at least one of the Honors Symposium presentations in May. Prerequisites: consent of instructor. | 1     | Spr (R. Fernald) |                                                                      |
191. Honors Seminar for Juniors—Open to juniors considering honors work in Human Biology. Weekly seminar surveys faculty research areas and considers writing honors proposals, research grant applications, and Human Subjects Committee approval. Speakers include honors students, faculty, and statistical and writing consultants. (AU) | 1     | Aut (Staff) |                                                                      |
192. Honors Seminar for Seniors—Weekly seminar considers modifying honors proposals and honors theses. Speakers include honors students, faculty, and statistical and writing consultants. Prerequisite: admission to the honors program; may be taken by juniors or seniors advanced in their honors work. | 1     | Aut (Staff) |                                                                      |
193. Research in Human Biology—Independent research conducted under faculty supervision, normally taken junior or senior year in pursuit of an honors project. May be taken more than one quarter for credit. Prerequisite: completed application to the honors program. | 1-10  | Staff |                                                                      |
194. Honors—Completion of the honors project. First component: the honors thesis, a final paper providing evidence of rigorous research, fully referenced, and written in an accepted scientific style. Second component: participation in the honors symposium, including a 10-minute oral presentation followed by a brief question and answer session. Prerequisites: 193, a draft of the honors thesis, and acceptance into the honors program. | 1-5   | Staff |                                                                      |
195A. Womens' Careers in Science and Medicine—Seminar on issues facing women who pursue
Careers in science, engineering, and medicine. Guest speakers include women active in research in the University, in industry, and in the medical community. Topics: navigating graduate/medical school, gender issues in the workplace, and balancing career and family.

1 unit, Spr (A. Fernald)

197. Internship in Human Biology—Limited to and required of Human Biology majors. Combines course work with a supervised field, community, or lab experience of student's own choosing. Must be arranged in advance and initiated at least three quarters prior to graduation.
4 units (Staff)

199. Directed Reading/Special Projects—Independent study open to Human Biology majors and non-majors. Human Biology majors must obtain a sponsor from the Human Biology associated faculty or the academic council. Non-majors and/or students who have not declared must obtain a sponsor only from the Human Biology associated faculty. Students must complete application in student services office.
1-4 units (Staff)

200. Teaching of Human Biology—For upper-division undergraduate and graduate students. Practical experience in teaching Human Biology or serving as an assistant in a lecture course.
1-5 units (Staff)

OVERSEAS STUDIES

Descriptions of these courses are in the "Overseas Studies" section of this bulletin or at the Overseas Studies office, 126 Sweet Hall.

106H. Man-Environment Interactions: Case Studies from Central Chile—Santiago.
5 units, Spr (Hajek)

112X. Environmental Biology of Russia—Moscow.
5 units, Aut (Yampolsky)

125X. Environmental Policy in Europe—(Same as Overseas Studies 122P.) Berlin.
4-5 units, Aut (Jakobeit)
Spr (Bedorff)

4 units, Win (Giraud)

HUMANITIES SPECIAL PROGRAMS

Emeriti: (Professors) Paul H. Kocher, Kurt Mueller-Vollmer, Lawrence V. Ryan
Chair: Alice Rayner

Teaching and Program Coordinator: Helen Brooks (English and Humanities)

Honors Program Committee in Charge: (Chair)
Alice Rayner (Drama); Helen Brooks (English and Humanities), Monika Greenleaf (Slavic Languages and Literatures), Brad S. Gregory (History), Robert Harrison (French and Italian), Joshua Landy (French and Italian), Andrea Nightingale (Classics), Arthur Strum (German Studies)

Graduate Program Committee in Charge: (Chair) Alice Rayner (Drama); Helen Brooks (English and Humanities), Hester Gelber (Religious Studies), Suzanne Lewis (Art), Andrea Nightingale (Classics), Rush Rehm (Drama)

HUMANITIES SPECIAL PROGRAMS

UNDERGRADUATE PROGRAMS

HONORS PROGRAM

The Honors Program in Humanities aims to heighten a sense of the relations among various humanistic disciplines, and to study issues in intellectual and cultural history through aesthetic, literary, historical, social, and ethical values.

ADMISSION

As an extradepartmental honors program, the Humanities Honors Program is open to any qualified undergraduate at Stanford, regardless of major. Interested freshmen and sophomores may obtain information from the program office. Applications should be submitted at the earliest opportunity, preferably Spring Quarter of the freshman year, and in every case before the junior year. Students must meet the following entrance requirements before being admitted to the program:

1. Completion of all at least two quarters of the Area 1 requirement, except in the case of transfer students, who must petition for exception.

2. A grade point average (GPA) of at least 3.3 (B+) in all course work in the humanities. Such course work includes any Area One sequence and all Writing and Critical Thinking sections; all courses in the departments of Art, Drama, and Music (except studio or performance courses); all courses in the departments of Asian Languages, Classics, English, French and Italian, German Studies, Slavic Languages and Literatures, and Spanish and Portuguese (except
first-year language courses); all courses in the departments of Comparative Literature, History, Philosophy, and Religious Studies; and all courses in the programs in Feminist Studies and Modern Thought and Literature.

**REQUIREMENTS**

1. Humanities 160 (either A or B): 5 units, sophomore year, with a grade of at least 'B+.' Prerequisite: completion of Area 1 requirement, unless special permission has been granted.

2. Unless students have strong intellectual reasons for doing otherwise, they must fulfill their World Cultures” (GER Area 4a) and “American Cultures” (GER Area 4b) requirements from courses offered in humanities disciplines.

3. In order to develop the requisite knowledge and methodological background to write a Humanities honors essay, students must take, during their sophomore and junior years, the required Humanities honors courses and additional humanities courses in disciplines of their interest.

4. Two different Humanities honors seminars in the series 190-198: 10 units, usually junior year. Prerequisite: 160. Both seminars must be completed by the end of the tenth quarter of undergraduate study in order for students to remain members in good standing.

5. An honors essay proposal, submitted to the Committee-in-Charge at least one year prior to the intended date of graduation, and approved by the committee (2 units, usually Winter or Spring Quarter, junior year).

6. An honors essay on a topic approved by the Committee-in-Charge (usually 5 units Autumn Quarter and 5 units Winter Quarter, senior year).

7. An overall minimum GPA of 3.0 (B) in all course work in order to remain in the program.

**BACHELOR OF ARTS**

Students in the Humanities Honors Program who have a strong interest in interdisciplinary study may obtain an A.B. in Humanities through one of the following alternatives:

The Concentration in Modern Thought and Literature—Submit a study plan fulfilling the area requirements of the concentration and have it approved by one of the designated Modern Thought and Literature undergraduate advisers.

This concentration is designed for students with a strong commitment to the interdisciplinary study of modern literature, cultural history, and critical theory. A complete delineation of the requirements for this concentration can be found under the “Modern Thought and Literature” section of this bulletin.

Students whose interdisciplinary interests are not confined to the modern period or do not otherwise fall within the parameters of Modern Thought and Literature should consider the following alternative:

The Humanities Concentration—Submit a study plan of interdepartmental course work constituting a unified study that cannot be encompassed by another undergraduate major at Stanford and have it approved by the Chair of the Committee in Charge of the Humanities Honors Program. Such individually designed concentrations can be period specific (e.g., Early Modern studies, Medieval Studies) or thematic (e.g., politics and literature, film studies, history of representation, aesthetic theory). The program of study must include at least twelve courses over and above the requirements of the honors program for a minimum of 60 units. Each of the twelve courses is designated to fall within one of the following three categories: literary study, historical study, philosophical study. The student takes at least six courses in one of these three areas and at least three courses in each of the other two areas. If additional courses are needed to make up the 60 unit minimum, the student may take those courses in any of the three categories. Each program of study must be signed by a Stanford faculty member who has agreed to act as the student’s academic adviser; the proposed program must then be approved by the chair. Changes in the study plan must be approved by the student’s adviser and must be kept on file in the program office.

Students who wish to major in Humanities with either concentration should receive approval of their concentrations before the end of the junior year. Competence in reading a foreign language is required of all Humanities honors majors and must be certified by appropriate course work or equivalent.

In both options described above, the A.B. degree conferred is in Humanities. Students following option 1 have the notation “Modern Thought and Literature” added to their transcripts after degree conferral. Students following option 2 choose a concentration title that reflects the focus of their study, and this likewise is noted on the transcript after degree conferral.

**GRADUATE PROGRAMS**

**MASTER OF ARTS**

Application is made through the Humanities Special Programs office. (Application forms are available from Graduate Admissions, Registrar’s Office, Old Union, Stanford University, Stanford CA 94305-3005.) The A.M. program in Humanities is ideally completed as a half-time, two-year program, but under some circumstances it may be completed in one year as a full-time program. The department does not offer financial aid for the master’s program. Qualified undergraduates at Stanford may petition to complete the A.M. pro-
program coterminally with their bachelor's degrees. The deadline for applying to the A.M. program is March 1 for both outside and coterminal applications.

REQUIREMENTS

1. Reading knowledge of at least one foreign language, to be completed prior to admission to the A.M. program.
2. Complete the five Graduate Program in Humanities (GPH) seminars (Humanities 311-315).
3. Complete four graduate-level courses in an approved "established discipline," to be determined in consultation with the chair. One of these must be a graduate-level research seminar for which a research paper is required (this paper must be filed in the department). Under "Statement of Purpose" on the application form, the candidate must indicate the established discipline (for example, art history, classics, philosophy, and so on) from which the graduate-level courses are drawn. The candidate must also note his or her qualifications for undertaking graduate study in that discipline. Once admitted, the student submits a proposed program of study to the chair, specifying the particular courses to be taken. The proposed program is approved on its own merits to ensure that the chosen graduate courses are suited to the A.M. in Humanities.
4. Satisfactory completion of 298, the Spring Quarter Graduate Program in Humanities Symposium.

The minimum number of units for the A.M. degree is 36. Additional elective units may be taken at the option of the student.

Undergraduates wishing to pursue the A.M. as part of a coterminal program should speak with the department administrator about the application procedures for coterminal students.

JOINT Ph.D.

The GPH provides graduate students in different disciplines an opportunity to broaden their knowledge of intellectual and cultural history by focusing on texts and ideas which have been central to all humanistic disciplines from classical Greece to the present. The program's seminars usually focus on specific topics or issues in the context of historical, literary, philosophical, and other disciplinary and theoretical orientations. The program provides a unique opportunity to study highly influential texts with a view to their relevance to the student's own disciplinary field.

Because the GPH supplements, and does not substitute for, department specialties, its members must be students earning the Ph.D. in an academic department at Stanford.

Application for entrance should be made to the chair. Members of the program are given first preference in registration for all of its offerings. Normally, the program involves taking Humanities 311-314, followed by 315, the core seminar on interdisciplinary study in the humanities. The course of study culminates in the GPH student symposium, which is developed and organized by the students in the program.

Although students in the GPH generally complete the program course work in their first two years of graduate study, requirements of some participating departments may necessitate completion of the GPH over three years. In some instances, one or more of the GPH seminars may fit within the requirements of the student's home department.

The departments of Art, Classics, Drama, English, French and Italian, German Studies, History, Modern Thought and Literature, Music, Philosophy, Religious Studies, Slavic Languages and Literatures, and Spanish and Portuguese all participate in the GPH. Doctoral students from other departments may participate with permission of their home departments and approval of the Chair of Humanities Special Programs.

REQUIREMENTS

1. Continue satisfactory work in the student's major field, in accordance with department requirements.
2. Complete the four chronologically ordered seminars (Humanities 311-314) followed by the core seminar on interdisciplinary study in the humanities (Humanities 315). To qualify for candidacy, students should complete at least three seminars in the first two years of graduate residence. Exemption from, or permission to audit, a seminar may be secured by petition if the student can show coverage of the material at an advanced level.
3. Participate in the GPH student symposium at the end of the second year of GPH course work (Humanities 298; registration for units is optional).
4. At least one quarter of teaching for Humanities Special Programs, normally a teaching internship in the third or fourth year; other interdisciplinary teaching may be substituted for this requirement by petition to the Committee-in-Charge (Humanities 299; registration for units is optional).
5. Reading knowledge of at least one foreign language, ancient or modern, to be certified in the first two years of graduate work.
6. Passing the University oral examination according to the schedule prescribed by the major department with one GPH representative, designated by the chair, as a member of the examining committee.
7. Submission of a Ph.D. dissertation acceptable to a committee which includes one representative of the GPH, designated by the chair.
COURSES

See quarterly Time Schedule for changes in listings.

61,62,63. Literature and the History of Ideas—
Introduction to fundamental ideas of the past. Emphasis is on the interconnection of literature, the arts, and philosophical and social thought in shaping the cultural traditions from the ancient to the contemporary world. The sequence also gives attention to non-European cultural traditions.

5 units, Aut (McCall, Staff)

62. The Middle Ages and the Renaissance—
GER:1 (DR:1) (three-quarter sequence)
5 units, Win (Evans, Staff)

63. The Enlightenment to the Present—
GER:1 (DR:1) (three-quarter sequence)
5 units, Spr (Eisen, Staff)

155. Incorporating an American Identity: Late 19th-Century Philosophy—Late 19th-century American philosophy; pragmatism and transcendentalism are examined as distinct products of the American experience, focusing on the various ways authors attempt to unify the divided house of self and country brought about by the Civil War. Emphasis is on the incorporation of the African-American experience into an American identity. Authors: Emerson, Melville, Dewey, James, Thoreau, W. E. B. DuBois, B. T. Washington.
5 units, Spr (Staff)

160A,B. Introduction to Interdisciplinary Studies—Themes and issues as treated in important works from various disciplines in the humanities. Prerequisites: completion of Area 1 requirement and enrollment in Humanities honors program. Students should take either 160A or 160B. Students who do not receive a grade of at least 'B+' must petition the committee for special permission to remain in the Honors Program.
5 units, Aut (Rayner)

160A. Introduction to Interdisciplinary Studies: Text and Context—Focuses on key concepts in critical theory (semiotics, hermeneutics, phenomenology, Marxism, psychoanalysis) as a means of understanding the historical, social, and aesthetic devices. A variety of approaches examine the different ways of interpreting and contextualizing texts of Shakespeare, Woolf, Beckett, etc., and other kinds of texts (film and visual art).
5 units, Aut (Rayner)

160B. Introduction to Interdisciplinary Studies: Innocence and Experience—The theme of the character and relationship of innocence and experience is traced through works that represent different genres, times, and cultures. Texts: the Taoist work, the Chuang Tzu; parts of Dante’s Divine Comedy; Joyce’s Dub-

liners; Melville’s Billy Budd; and selections from the philosopher Stuart Hampshire and a Christian theologian such as Augustine or Aquinas.
5 units, Spr (Yearley)

175. Individual Work—For students in the Humanities honors program who have objectives not met by current course offerings.
2-5 units, any quarter (Staff)

190-198. Interdisciplinary Honors Seminars on the Nature of the Humanities—Students in the Humanities Honors Program must complete two different seminars from different areas before the end of the tenth quarter of undergraduate study. Humanities majors in Modern Thought and Literature take one of those seminars from the 197 series. Other students may enroll if space allows and with the instructor’s consent. Prerequisite: 160.

192G. The Arts and the Humanities: Philosophical Art—Surveys some of the important ideas and practices of avant garde artists in the 20th century. Emphasis is on the various interpretations of the work of Duchamp.
5 units, Spr (Guttmann)

193A. Philosophy and the Humanities: Philosophy of the Human Sciences—(Same as Philosophy 282.) Investigation of the status of knowledge claims in the humanities, including questions about the possibility of humanistic knowledge.
5 units, Spr (Staff)

194B. Literature and the Humanities: Narrative, Time, and Ideology—The interrelationship of narrative structure, time, and ideology. Narrative represents events and it constitutes and interprets them. As such, narrative is crucial to the study of the nature of humanistic discourse and to the interpretive process as applied to a diverse selection of texts, including film and art: Augustine, Shakespeare, Donne, Woolf, Levi, Beckett.
5 units, Win (Brooks)

194M. Literature and the Humanities: Being and Time in the Novels of Milan Kundera—(Same as Slavic Languages and Literatures 157.) Critical analysis of Milan Kundera’s art and philosophy of the novel as represented by The Joke, Life is Elsewhere, The Book of Laughter and Forgetting, The Unbearable Lightness of Being. Discussion/supplementary readings in philosophy, theory, and literature on topics such as memory, the mind-body problem, eternal recurrence, the modern.
5 units, Aut (Moeller-Sally)

198H. Modern Culture and the Humanities: Topics in American Comic Performance—Laughter about Identity, Class, Race, and Gender from Royell Tyler to Richard Pry-
200A, B, C Senior Research—Limited to Humanities honors students. A critical essay of about 15,000 words. Students develop proposal beginning in winter of junior year, and research a topic and write the essay during senior year, taking a total of five units each of 200B and 200C, spread out during senior year as best suits their schedules. Deadline for submitting essays is May 15, or the first working day after May 15 if that date falls on a weekend.

200A. Research Proposal—Preliminary planning and study. Student drafts a proposal in winter of the junior year to submit to the Committee in Charge for suggestions regarding focus and bibliography. After revisions, student resubmits fully developed proposal to the committee for additional comment and/or final approval. 60 hours over two quarters are expected of students developing their essay proposals. Two units are awarded for this work; students may elect to enroll for both units in a single quarter, or may take one unit in each quarter. Students usually make revisions of some kind in either scope or formulation of the topic. Students overseas submit proposals and receive feedback by fax or e-mail.

1-2 units (Rayner)

200B. Senior Research—Regular meetings with tutor (thesis adviser). Prerequisite: 200A. 1-5 units (Rayner)

200C. Senior Research—Regular meetings with tutor; submission of complete first draft at least two weeks before final deadline. Final grade is assigned by chair of program based on evaluations received from the student’s tutor and a second reader appointed by the committee. Prerequisite: 200B.

1-5 units (Rayner)

GRADUATE

275. Directed Reading

1-5 units (Staff)

298. GPH Symposium—Required of doctoral and master’s students in GPH. Participation in the student-organized symposium; presentation of a paper informed by texts addressed in GPH seminars.

1-3 units, Spr (Rayner)

299. Teaching Internship—Required of doctoral students in GPH. Preparation for teaching in interdisciplinary programs. Closely supervised teaching responsibilities in the Humanities CIV sequence (61, 62, 63).

1-3 units (Brooks)

311, 312, 313, 314, 315. Graduate Program in Humanities Seminars—Required of students in GPH. Open to other graduate students by consent of the instructor.

311. Classical Seminar

3-5 units, Aut (Nightingale)

312. Medieval Seminar

3-5 units, Win (Harrison)

313. Renaissance/Early Modern Seminar

3-5 units, Spr (Brooks)

314. Modern Seminar

3-5 units, Aut (Landy)

315. Graduate Core Colloquium: The Interdisciplinary Study of the Humanities

3-5 units, Win (Robinson)

INTERNATIONAL POLICY STUDIES

Co-Chairs: Judith L. Goldstein (Political Science), Roger G. Noll (Economics)

Committee in Charge: David B. Abernethy (Political Science), F. John Bendor (Business), Barton J. Bernstein (History), Coit D. Blacker (Institute for International Studies), Bruce Bueno de Mesquita (Hoover Institute), John Cogan (Hoover Institute), David L. Freyberg (Civil Engineering), Avner Grief (Economics), Stephen H. Haber (History), Thomas C. Heller (Law), Timothy E. Josling (Institute for International Studies), Stephen D. Krasner (Political Science), Anne O. Krueger (Economics), Michael McFaul (Political Science), Ronald L. McKinnon (Economics), Norman M. Naimark (History), Michel C. Okonkobenge (Institute for International Studies), Robert A. Packenham (Political Science), Scott D. Sagan (Political Science - ex officio)

Affiliated Faculty: Simon Jackman (Political Science), James D. Morrow (Hoover Institution), Douglas Rivers (Political Science), Hilton L. Root (Hoover Institution), Frederic J. Zimmermann (Food Research Institute)

GRADUATE PROGRAM

MASTER OF ARTS

International Policy Studies (IPS) is an interdisciplinary program combining internationally oriented courses offered throughout the university. Its goal is to provide students with in-depth exposure to a range of issues they will face in the 21st century in international business and public policy, and develop a foundation of skills and knowledge to address those issues. The program allows students to focus on either international economics, development studies, security issues, or the world environment.

IPS requires the completion of 45 units of approved courses, plus a 5-unit core requirement. In addition, students are required to complete the
following preliminary course work, preferably taken prior to, or concurrent with, matriculation into the program: Economics 51, 52, and 165; Political Science 35, 134A, and 134B; and Statistics 60 or its equivalent.

ADMISSION

Undergraduates at Stanford may apply for admission during their senior year. Application requires an up-to-date transcript, two letters of recommendation from University-level instructors, a course paper of at least ten pages, and a statement of relevant personal, academic, and career plans and goals. Students enroll in the program in the Autumn Quarter following completion of 180 units. Application is made through the International Relations (IR)/IPS office. The closing date for filing applications and supporting credentials is January 1 of the senior year.

Applicants from schools other than Stanford or applicants from Stanford who did not apply in their senior year should submit the Graduate Admission Application form and provide a statement setting forth relevant personal, academic, and career plans and goals. Transcripts, three letters of recommendation, Graduate Record Examination (GRE) scores and a writing sample of a least ten pages. Applicants are expected to have an A.B. or B.S. degree from an accredited school. Applications for admission at the graduate level are accepted only for the Autumn Quarter and must be filed together with supporting credentials by the preceding January 1.

DEGREE REQUIREMENTS

To receive the A.M. degree in International Policy Studies the student must complete 45 units of course work, plus the core requirement item 1 below:

1. Core Requirement: IPS 200 (Seminar: Current Issues in International Politics)
2. Skills Requirement (complete three of the following IPS courses):
   a) 201A (Introduction to Political Data Analysis)
   b) 201B (Statistical Modeling)
   c) 201C (Advanced Topics in Statistical Modeling)
   d) 201D (Strategy in Politics)
   e) 201E (Economics and Public Policy)
4. American Foreign Policy Requirement: IPS 208 (Decision Making in U.S. Foreign Policy)
5. Functional Areas (complete two of the following IPS courses in two different functional areas):
   a) Political Economy: 203 (Issues in International Political Economy)
   b) Conflict/Security Studies: 204A (Theories of International Cooperation and Conflict)
   c) World Environment: 205 (Natural Resource Economics and Policy)
   d) Political and Economic Development: 206A (Seminar: Institutions and Development)
   207A (Seminar: Economics of Poverty in Developing Countries)
6. Specialization:
   Students can specialize in either:
   a) Thesis Option: students write a thesis under the guidance of a faculty member.
   b) Course Option: students enroll in two additional classes in the same track from the cognate curriculum list.
   c) Area Specialization: students enroll in three additional classes from the cognate curriculum list in one region of specialization (Latin America, Western Europe, Eastern Europe/Russia, Asia, or Middle East).
8. Complete and file the IPS Program Proposal, available in the IPS office, before the last day of classes of the first quarter of enrollment as a graduate student. All students should list the 45 units fulfilling the IPS requirements (plus the required IPS 200 course). Categorical students must list 45 unduplicated units, that is units for courses not counted toward the graduate degree.
9. Use Axess to file an Application to Graduate by the appropriate deadline, and complete and file the IPS Program Requirement Completion Worksheet with the IPS office.

COGNATE CURRICULUM

For information and course descriptions, please pick up current quarterly listings at the IR/IPS Office.

GRADE REQUIREMENTS

All courses to be counted toward the 45 units must be taken for a grade of a ‘B-‘ or higher.

FINANCIAL AID

Undergraduates may petition for a fifth year of financial aid as coterminals. Note that these petitions can only be made if the undergraduate degree has not been conferred. University-based financial aid is not normally available for graduate students entering the IPS program.

COURSES

200. Seminar: Current Issues in International Politics—Priority given to students in IPS. Lecture series. Scholars present their analysis of the major international public policy issues. 5 units. Aut (Goldstein)
201A. Introduction to Political Data Analysis—
(Enroll in Political Science 200A.)
5 units, Aut (Rivers)

201B. Statistical Modeling for Political Science—
(Enroll in Political Science 200B.)
5 units, Win (Jackman)

201C. Seminar: Advanced Topics in Statistical Modeling—(Enroll in Political Science 203.)
5 units, Spr (Jackman)

201D. Strategy in Politics—(Enroll in Political Science 200.)
5 units, Spr (Morrow)

201E. Economics and Public Policy—(Enroll in Public Policy 104.)
5 units, Win (Noll)

202. Issues in International Economics—Analysis of current issues in international economic systems (multilateral and regional liberalization of trade in goods and services, and developments in the international monetary and financial system). Topics: WTO and its follow-up to the Uruguay Round; incorporating China and Russia into the WTO; regional free trade areas and their relationship to the multilateral trade system; economic integration in Europe; the problems of the transition economies; and the role of developing countries in the "new" trade system. Reviews theoretical basis for analyzing trade policy, including the gains from trade, the distributional impacts of protection, the impact of trade preferences, and the arguments for forming customs unions. Class presentation.
5 units, Spr (Josting)

5 units, Win (Goldstein)

204A. Theories of International Cooperation and Conflict—(Enroll in Public Policy 201.)
4 units, Spr (Bueno de Mesquita)

206A. Seminar: Institutions and Development—
(Enroll in Political Science 324.)
5 units, Win (Packenham)

207A. Seminar: Economics of Poverty in Developing Countries—Introduction to the economic analysis of poverty and inequality and of antipoverty and redistributive programs in developing countries. Emphasis is on dynamic modeling of the reproduction of poverty and inequality and the long-term effects of policy. Prerequisites: Economics 51, 52, and 80, or their equivalents.
5 units, Win (Zimmerman)

208. Seminar: Decision Making in U.S. Foreign Policy—(Same as Political Science 241B.) Priority given to students in International Policy Studies. The formal and informal processes involved involved in U.S. foreign policy decision-making. The formation, conduct, and implementation of policy, emphasizing the role of the president and executive branch agencies. Theoretical and analytical perspectives are supplemented by case studies. Preparation of policy memorandum and substantial research paper or take-home final.
5 units, Aut, Spr (Blacker)

INTERNATIONAL RELATIONS

Chair: Judith L. Goldstein (Political Science)
Committee in Charge: David B. Abernethy (Political Science), F. John Bendor (Business), Barton J. Bernstein (History), Coit D. Blacker (Institute for International Studies), Bruce Bueno de Mesquita (Hoover Institute), John Cogan (Hoover Institute), David L. Freyberg (Civil Engineering), Avner Grief (Economics), Stephen H. Haber (History, Thomas C. Heller (Law), Timothy E. Josling (Institute for International Studies), Stephen D. Krasner (Political Science), Anne O. Krueger (Economics), Michael McFaul (Political Science), Ronald I. McKinnon (Economics), Norman M. Naimark (History), Roger G. Noll (Economics), Michael C. Oksenberg (Institute for International Studies), Robert A. Packenham (Political Science), Scott D. Sagan (Political Science, ex officio)

Affiliated Faculty: Masahiko Aoki (Economics), Joel S. Beinin (History), Byron Bland (Education), Michal J. Boskin (Economics), Bernard P. Cohen (Sociology), Rachel Cohen (Philosophy), Richard Dasher (Asian Languages), Peter Duus (History), Marcel Fauchamps (Economics), Walter P. Falcon (Institute for International Studies), Naushad Forbes (Science, Technology, and Society), Kurt T. Gaubatz (Political Science), Hester G. Gelber (Religious Studies), Donald J. Harris (Economics), Mayako Inoue (Asian Languages), Kennell Jackson, Jr. (History), David M. Kennedy (History), Anjini Kochar (Economics), Gaël Lapidus (Institute for International Studies), Marcos Lisboa (Economics), Mark I. Mancall (History), Susan K. Matisoff (Asian Languages), Michael M. May (Engineering-Economic Systems and Operations Research), Robert E. McGinn (Industrial Engineering), Thomas J. Nechyba (Economics), Jean C. Oi (Political Science), Daniel I. Okimoto (Political Science), Susan M. Okin (Political Science), Yingyi Qian (Economics), Clark W. Reynolds (Food Research Institute), Condoleezza Rice (Political Science), Douglas Rivers (Political Science), Richard Roberts (History), Paul A. Robinson (History), Hilton L.
Root (Hoover Institute), Nathan Rosenberg (Economics), Armin Rosencranz (Human Biology), Scott D. Rozelle (Economics), Debra Rudolph (Asian Languages), James J. Sheehan (History), Brent Sockness (Religious Studies), John B. Taylor (Economics), Lyman P. Van Slyke (History), Andrew Walder (Sociology), Amir Weiner (History), John D. Wirth (History), Frederic J. Zimmerman (Food Research Institute)

Affiliated Visiting Faculty: Aaron Belkin (Political Science), Ronald L. Jepperson (Political Science), Conrad Totman (History)

International Relations (IR) is an interdisciplinary undergraduate major focusing on the study of the changing relations among nation-states (political, economic, and cultural). Students pursue a course of study in world politics that includes classes in political science, economics, history and languages, focusing on a range of issues including international security, international political economy, political and economic development, and the politics of the transition to democracy. All International Relations majors must spend at least one quarter abroad and show proficiency in a foreign language.

The International Relations program provides students with both the foundational skills and specific knowledge necessary to analyze the behavior of contemporary countries. The major prepares students for a variety of careers in government, non-governmental organizations, and business, both domestic and international. In addition, many International Relations students go on to graduate school either in law, business, economics, or political science.

UNDERGRADUATE PROGRAMS
BACHELOR OF ARTS

Note—Requirements for the major remain essentially the same for the 1997-98 year, but the designation of International Relations classes into "clusters" has been changed to "tracks." See Information Book for International Relations Majors available in the International Relations Program office.

Requirements for the major (65 units) are:
1. Political Science 35.
2. Either Political Science 134A or 134B or History 172A.
3. Either Economics 1 or 51, plus two additional Economics courses.
4. At least one of the following skills classes:
   Political Science 100A
   Sociology 180A,B
   Statistics 60
   Statistics 190
5. Specialization in one of three tracks by completing at least four additional courses from a specific list of classes. The three tracks are: Comparative Political and Historical Analysis (CPHA); Comparative Culture, Ethnicity, and Philosophy (CCEP); Comparative and International Political Economy (CIPE). Specific classes may change. Consult the updated Course Offering lists available in the International Relations office.
6. Completion of at least three additional courses in each of the two remaining tracks. At least one course must be from a third track.
7. At least one seminar or colloquium.
8. At least one course designated as writing intensive.
9. Demonstrated proficiency in a foreign language (up to two full years of study) which can be met by either completing two years of University-level instruction or by passing a proficiency exam. Foreign language units do not count toward the IR major. Advanced placement units do not fulfill the foreign language requirement.
10. Completion of study overseas either through the Stanford Overseas Studies Program or a preapproved non-Stanford program.
11. Under normal circumstances, up to 10 units of Honors Thesis work may be used towards Track requirements (majors declared after September, 1997), or Related Units (majors declared before September, 1997).

The International Relations major must be declared before the end of the second quarter of the junior year by submission of an acceptable proposal to the chair of the program. Students completing a double major or fulfilling International Relations as a secondary major or declaring a minor are also required to file a proposal by the end of the second quarter of the junior year.

Students who have already been accepted as majors in the program may petition for credit for courses not listed in this section of the bulletin or in the updated course lists. Petitions should contain as much information as possible about the course in question (syllabi, reading lists, examinations, papers, and so on). Courses should be clearly international in nature. Petitions are available in the International Relations Program office.

MINORS

A minor in International Relations is intended to provide an interdisciplinary background allowing a deeper understanding of contemporary international issues. Students complete the minor by taking seven unduplicated courses from the IR curriculum, including the following:
1. Political Science 35
2. Political Science 134A and 134B
3. Four upper-division courses from one of the three tracks. Specific courses may change. Consult the updated Course Offering lists available in the International Relations office.

Declaration of the minor must take place no later than the end of the second quarter of the junior year. To declare, first pick up the updated Course Offering lists from the International Relations office and then access the Registrar's Web page and select "Minor Declaration."

Course work must be completed one quarter prior to the final quarter. A required, finalized, minor course list and official transcript must be submitted to the IR Program office by the end of the second week of the student's final quarter for minor certification.

Students pursuing a secondary major are not eligible to declare the minor in International Relations. Send questions by email to KP.ASK@forsythe.stanford.edu.

HONORS PROGRAM

The International Relations honors program offers qualified students the opportunity to conduct a major independent research project under faculty guidance. Such a project requires a high degree of initiative and dedication, significant amounts of time and energy, and demonstrated skills in research and writing.

In their junior year, students should consult with prospective honors advisers, choose the courses that provide academic background in their areas of inquiry, and demonstrate an ability to conduct independent research. Students should submit their honor thesis proposal during Spring Quarter of their junior year if they are applying for a summer grant, or by the end of the third week of Autumn Quarter of their senior year.

Prerequisites for participation include a 3.5 grade point average (GPA) in courses counted towards the IR major, a strong overall academic record, successful experience in writing a research paper, and submission of an acceptable thesis proposal. Students admitted to the honors program enroll in a three-quarter Honors Colloquium, 2 units a quarter, in addition to 3 units a quarter with their faculty adviser. Under normal circumstances, up to 10 units of honors thesis work may be used towards Track requirements (majors declared after September, 1997), or Related Units (majors declared before September, 1997). Students must receive at least a grade of 'B+' in order to graduate with honors in International Relations or receive honors credit towards their degree requirements.

Further details of the International Relations honors program are available from the program office.

GRANTS

The International Relations Program offers funds to students writing senior honor theses in international relations to finance travel to places where field work or library research is to be conducted, or to support intensive work at Stanford. The grants are intended for use by IR majors during the summer between their junior and senior years. The creativity and intellectual promise of the project and the preparation of the student are major considerations in awarding these funds. Applications are made during the Spring Quarter through the Office of Undergraduate Research Opportunities at Stanford.

GRADUATE PROGRAM

MASTER OF ARTS

It is possible for students majoring in International Relations to work simultaneously for a coterminal master's degree in a number of related fields. Coterminal students should consult advisers in both departments or programs to make sure they fulfill the degree requirements in both fields. For information on the A.M. program in International Policy Studies, see the "International Policy Studies" section in this bulletin.

COURSES

Note—For academic year 1997-98, the designation of International Relations classes by "clusters" has been changed to "tracks." For information on Track (cluster) designations, consult the updated Course Offering Lists available in the International Relations Program office, and the quarterly University Time Schedule.

(WIM) indicates that the course meets the Writing in the Major requirements.

CORE ECONOMICS


5 units, Aut (Taylor)
Win (Clerici-Arias)
Spr (Boskin)

51. Economic Analysis I—(Graduate students register for 151.) The nature of economic systems. Methods of allocating economic resources. Theories of production and consumer choice. The role of markets and prices in a decentralized system. Principles of efficient and equitable allocation. Calculus is used to develop theoretical structures appropriate for doing modern applied economic analysis. Pre-
requisites: Economics 1 and 180 (or Math. 43 or equivalent).
5 units, Aut (Nechyba)
Win (Hammond)
Spr (Lisboa)

HISTORY

172A. The United States since 1945—Analyzes foreign policy and politics, and deals with social themes and intellectual history. GER:3b (DR:9)
4-5 units, Win (Bernstein)

POLITICAL SCIENCE

35. International Politics—(Same as 135.) Approaches to the study of world politics including realism, liberalism, and decision-making theories. WW I, nuclear weapons debates, and contemporary international security and economic problems. The normative and policy implications of different theories. GER:3b (DR:9)
5 units, Aut (Krasner)

100A. Introduction to Political Data Analysis—(Same as 200A.) Applications of probability and statistical methods in political science.
5 units, Aut (Rivers)

134A. Strategy, War, and Politics—Traditional and modern theories on the causes of war and sources of peace. Contrasting explanations for the origins of WW I and II; alternative theories of deterrence in the nuclear age; the causes of war in the Persian Gulf, and ethnic conflicts in the post-Cold War era. GER:3b (DR:9)
5 units, Spr (Sagan)

134B. America and the World Economy—Developmental approach analyzes American foreign economic policy, centering on a historical analysis of the basic issues involved in the formation of American foreign policy. Issues: evolution of American tariff and trade policy, development of mechanisms for international monetary management, and American foreign investment policy reflected in changing political goals pursued by American central decision-makers. Prerequisite: 35 or equivalent.
5 units, Win (Goldstein)

SOCIOLOGY

180A. Methods for Sociological Research—(Graduate students register for 380A.) Introduces the methods used in contemporary sociological research, focusing on strategies for designing research and analyzing data. Associated lab, see 180B.
2-3 units, Aut (B. Cohen)

180B. Methods for Sociological Research—(Graduate students register for 380B.) Lab exercises consider problems of collecting observations, constructing theory, testing hypotheses and generalizing research results. Corequisite: Sociology 180A.
5 units, Aut (Rosencranz)

STATISTICS

60. Introduction to Statistical Methods: Precalculus—(Graduate students register for 160.) A nonmathematical study of statistical methods. Emphasis is on statistical techniques. Organization of data, averages, variability, and association. Statistical inference, test of hypotheses, estimation, and confidence intervals. Computer statistical packages are used. Students cannot receive credit for both Statistics 60 and Psychology 60. GER:2c (DR:4)
5 units, Aut, Spr (Larsen)
Win (Walther)
Sum (Staff)

190. Introduction to Statistical Methods (Postcalculus) for Social Scientists—(Same as Economics 80.) Introduction to statistical methods relevant to the social sciences. Emphasis is on description and examples of the use of statistical techniques. Probability: basic rules of probability, conditional probability, Bayes' rule, discrete and continuous probability distributions. Statistical inference: point estimation, tests of hypotheses, confidence intervals, large-sample methods. Data analysis: linear regression techniques and diagnostics. Statistical computer packages (e.g., Minitab) are used for inference and data analysis. Prerequisites: Math. 41 or equivalent, consent of instructor. GER:2c (DR:4)
5 units, Aut (Switzer)
Win (Ryu)
Spr (Donaldson)

OFFERING LISTS

For information on Track (cluster) designations, consult the updated Course Offering Lists available in the International Relations Program Office, and the quarterly University Time Schedule.

199B. Undergraduate Colloquium: Decision-Making in International Crises—The A-Bomb, the Korean War, and the Cuban Missile Crisis—(Enroll in History 252.) For advanced undergraduates. Three sets of events: atomic bombing of Japan, the Korean War, and the Cuban missile crisis. (WIM)
5 units, Aut (Bernstein)

199E. Seminar: Advanced Study in Environmental Institutions and Policies in Developing Countries—Examines the tension between environmental protection and economic growth in developing countries. Compliance by developing countries with international environmental agreements. Focus is Russia (Siberia), China, India, Thailand, Nigeria, Mexico and Ecuador. (WIM)
5 units, Aut (Rosencranz)
199G. Seminar: Democratic States and International Relations—(Enroll in Political Science 143K.) The influence of democracy and democratization on international relations. Role of public opinion in the formation and conduct of foreign policy. Relationship between domestic and international constraints on democratic decision-makers. Prerequisite: Political Science 35 or consent of instructor. (WIM)
5 units, Spr (Gaubatz)

199N. Seminar: Advanced Study in the United Nations and the Wars of the 1990's—(Enroll in Political Science 142S.) The UN has in recent years played a lead role in conflict management. Topics: peacekeeping, the implementation of peace agreements in civil wars, humanitarian intervention, mediation, preventative diplomacy, UN reform, and relations between the U.S. and the UN. Case studies evaluate the UN's performance in preventing, managing, and resolving various wars in the 1990s including Cambodia, El Salvador, Mozambique, Rwanda, and the former Yugoslavia. (WIM)
5 units, Aut (Stedman)

199P. Seminar: Political Psychology and International Relations—(Enroll in Political Science 137.) Psychological theories and international relations. Topics: Why does the U.S. military prevent gay and lesbian soldiers from defining who they are? Why were Hitler's soldiers willing to commit mass murder? Why did Saddam Hussein fight a war that he had no chance of winning? How psychological factors might affect international political outcomes. Theories of individuals, groups, organizations, and applications of those theories to various political domains. (WIM)
5 units, Spr (Stedman)

199S. Seminar: Advanced Study in Poverty and Inequality in Developing Countries—Television and newspaper representations of poverty, particularly of Third World, often have the effect of demuring poverty of causation and of stripping agency from the poor. People with a liberal disposition think of the poor as innocent and often actionless victims who need help from the outside. People with a conservative disposition think of the poor as lacking the skills or the energy or the freedom from government meddling to overcome their starting point. Introduces an understanding of poverty and inequality in the developing world that emphasizes the structural causes of poverty and the actions of the poor themselves in attenuating or alleviating their own poverty. (WIM)
5 units, Win (Zimmerman)

See the respective department listings for course descriptions and General Education Requirement (GER) information for the following.

ANTHROPOLOGY

121. Japanese Society and Culture
5 units, Spr (Inoue)

ASIAN LANGUAGES

51. Japanese Business Culture
3 units, Win (Dasher)

91. Traditional East Asian Civilization: China
5 units, Aut (Rudolph)

92. Traditional East Asian Civilization: Japan
5 units, Win (Matisoff)

ECONOMICS

113. Technology and Economic Change
5 units, Spr (Rosenberg)

115. European Economic History
5 units, Win (Voth)

118. The Economics of Development—Prerequisite: 51.
5 units, Spr (Kochar)

122. The Theory of Capitalist Development
5 units, Aut (Harris)

124. The Japanese Economy
5 units, Spr (Aoki)

126. Comparative Economic Institutions: The Economics of Transition
5 units, Spr (Qian)

150. Economics and Public Policy—(Same as Public Policy 104.) Prerequisite: 51.
5 units, Win (Noll)

165. International Economics—Prerequisites: Economics 1, 51, 52.
5 units, Aut (Gilfedder)
Spr (Desmet)

215. Industrialization, Growth, and Economic Development
5 units, Aut (Fafchamps)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Term</th>
<th>Instructor</th>
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<tr>
<td>266</td>
<td>International Trade Theory</td>
<td>5</td>
<td>Win (Krueger)</td>
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<tr>
<td>267</td>
<td>Special Topics in International Economics</td>
<td>5</td>
<td>Spr (Krueger)</td>
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<tr>
<td>293</td>
<td>Reform and Transition in Socialist Economics</td>
<td>5</td>
<td>Spr (Qian)</td>
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<tr>
<td>293A</td>
<td>Reform and Transition in Socialist Economics</td>
<td>5</td>
<td>Spr (Qian)</td>
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<td>103</td>
<td>The World Food Economy</td>
<td>5</td>
<td>Win (Falcon, Naylor)</td>
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<tr>
<td>118</td>
<td>Economic Development in Latin America</td>
<td>5</td>
<td>Win (Reynolds)</td>
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<tr>
<td>80</td>
<td>Culture, Politics, and Society in Latin America</td>
<td>5</td>
<td>Win (Wirth)</td>
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<tr>
<td>85Q</td>
<td>Stanford Introductory Seminar: Jews and Moslems</td>
<td>5</td>
<td>Spr (Rodrigue)</td>
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<td>90Q</td>
<td>Stanford Introductory Seminar: Buddhist Political and Social Theory</td>
<td>5</td>
<td>Spr (Sheehan)</td>
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<tr>
<td>120C</td>
<td>20th-Century Russian and Soviet History</td>
<td>5</td>
<td>Aut (Weiner)</td>
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<tr>
<td>125</td>
<td>20th-Century Eastern Europe</td>
<td>5</td>
<td>Aut (Naimark, Koloski)</td>
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<tr>
<td>127D</td>
<td>20th-Century Germany</td>
<td>5</td>
<td>Spr (Mancall)</td>
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<tr>
<td>136A</td>
<td>European Thought and Culture in the 19th Century: From Romanticism to Modernism</td>
<td>5</td>
<td>Win (Robinson)</td>
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<tr>
<td>148C</td>
<td>Africa in the 20th Century</td>
<td>5</td>
<td>Spr (R. Roberts)</td>
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<tr>
<td>154</td>
<td>Peace Studies</td>
<td>5</td>
<td>Spr (Bernstein, Bland Noddings, Ross)</td>
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<tr>
<td>165C</td>
<td>The United States in the 20th Century</td>
<td>5</td>
<td>Spr (Kennedy)</td>
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<td>172A</td>
<td>The United States since 1945</td>
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<td>Win (Bernstein)</td>
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<td>179</td>
<td>History of Mexico</td>
<td>5</td>
<td>Aut (Maurer)</td>
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<td>180</td>
<td>20th-Century Brazil</td>
<td>5</td>
<td>Spr (Wirth)</td>
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<tr>
<td>186A</td>
<td>Modern India: History, Society, Cultures</td>
<td>5</td>
<td>Win (Mancall)</td>
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<tr>
<td>187B</td>
<td>The Middle East in the 20th Century</td>
<td>5</td>
<td>Aut (Beinin)</td>
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<tr>
<td>187C</td>
<td>Women in the Modern Middle East</td>
<td>5</td>
<td>Spr (Beinin, Reynolds)</td>
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<tr>
<td>192C</td>
<td>Modern and Contemporary Chinese History</td>
<td>5</td>
<td>Spr (Van Slyke)</td>
<td></td>
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<tr>
<td>194D</td>
<td>The Rise of Modern Japan</td>
<td>5</td>
<td>Spr (Duus)</td>
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<tr>
<td>219S</td>
<td>Undergraduate Research Seminar: The Soviet Civilization</td>
<td>5</td>
<td>Spr (Weiner)</td>
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<td>227</td>
<td>Undergraduate Colloquium: War and Peace in the 20th Century</td>
<td>5</td>
<td>Spr (Sheehan)</td>
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<tr>
<td>247</td>
<td>Greater East Africa and its Historical Writing</td>
<td>5</td>
<td>Aut (Jackson)</td>
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<tr>
<td>248A</td>
<td>Undergraduate Colloquium: The End of Slavery in Africa and the Americas</td>
<td>5</td>
<td>Win (Roberts)</td>
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<td>272A</td>
<td>Undergraduate Colloquium: American Foreign and War Policy at Home and Abroad from Pearl Harbor to Vietnam, 1941-68</td>
<td>5</td>
<td>Spr (Bernstein)</td>
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<tr>
<td>278</td>
<td>Undergraduate Colloquium: Historical Aspects of Underdevelopment in Latin America</td>
<td>5</td>
<td>Spr (Maurer)</td>
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<td>280</td>
<td>Undergraduate Colloquium: Modern Mexico</td>
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<td>Win (Maurer)</td>
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<td>281A</td>
<td>Undergraduate Colloquium: Environmental History of the Americas</td>
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<tr>
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<td>Undergraduate Colloquium: Problems in Israeli History—The National Identity and Political Culture of the Israeli State</td>
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<td>Aut (Mancall)</td>
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<td>286</td>
<td>Undergraduate Colloquium: Economic and Social History of the Modern Middle East</td>
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<td>Win (Beinin)</td>
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<tr>
<td>288</td>
<td>Undergraduate Colloquium: Palestine and the Arab-Israeli Conflict</td>
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<tr>
<td>291</td>
<td>Undergraduate Colloquium: Women in Japanese History</td>
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<tr>
<td>298</td>
<td>Imperialism, Colonialism, and National Identity in Modern Japan</td>
<td>5</td>
<td>Win (Duus)</td>
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<td><strong>HUMAN BIOLOGY</strong></td>
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<td>125</td>
<td>Environmental Policy and Law</td>
<td>5</td>
<td>Spr (Rosencranz)</td>
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<td>131</td>
<td>Natural Resources Policy and Law</td>
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<td>Win (Rosencranz)</td>
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<td>Global Environmental Policy</td>
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<td>International Health</td>
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<td>K. Smith</td>
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<td>115.</td>
<td>Militaries and Democratization in Latin America</td>
<td>5</td>
<td>Winter</td>
<td>Trinkunas</td>
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<td>195.</td>
<td>Perspectives on Sustainable Development in Latin America</td>
<td>5</td>
<td>Winter</td>
<td>Rosset</td>
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<td>Introduction to Moral Theory</td>
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<td>Spring</td>
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<td>30.</td>
<td>Introduction to Political Philosophy</td>
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<td>Fall</td>
<td>Gruen</td>
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<td>111.</td>
<td>Political Philosophy</td>
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<td>Gruen</td>
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<td>133P.</td>
<td>Political Economy of Latin American Development</td>
<td>5</td>
<td>Fall</td>
<td>Packenham</td>
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<td>115.</td>
<td>Chinese Politics</td>
<td>5</td>
<td>Winter</td>
<td>Oi</td>
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<tr>
<td>118A.</td>
<td>Political Change in Tropical Africa—GER:3b (DR:2 or 9)</td>
<td>5</td>
<td>Spring</td>
<td>Abernethy</td>
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<tr>
<td>119M.</td>
<td>Seminar: Revolutions</td>
<td>5</td>
<td>Spring</td>
<td>McFaul</td>
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<tr>
<td>121M.</td>
<td>Russian Politics</td>
<td>5</td>
<td>Winter</td>
<td>McFaul</td>
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<tr>
<td>122.</td>
<td>Decolonization in Asia and Africa, 1940-80</td>
<td>5</td>
<td>Spring</td>
<td>Abernethy</td>
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<tr>
<td>125.</td>
<td>The Rise of Industrial Asia</td>
<td>5</td>
<td>Winter</td>
<td>Abernethy</td>
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<tr>
<td>134A.</td>
<td>Strategy, War, and Politics—(Fulfills American Foreign Policy requirement.)</td>
<td>5</td>
<td>Fall</td>
<td>Sagan</td>
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<tr>
<td>134B.</td>
<td>America and the World Economy—(Fulfills American Foreign Policy requirement.)</td>
<td>5</td>
<td>Winter</td>
<td>Goldstein</td>
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<td>139.</td>
<td>Seminar: Japanese Foreign Policy</td>
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<td>Fall</td>
<td>Okimoto</td>
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<td>142K.</td>
<td>International Law</td>
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<td>Winter</td>
<td>Gaubatz</td>
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<tr>
<td>218L.</td>
<td>Ethnicity and Nationalism in Soviet and Post-Soviet Politics</td>
<td>5</td>
<td>Winter</td>
<td>Lapidus</td>
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<tr>
<td>219M.</td>
<td>Seminar: Democratic Transitions</td>
<td>5</td>
<td>Winter</td>
<td>McFaul</td>
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<tr>
<td>223.</td>
<td>Seminar: Japanese Politics</td>
<td>5</td>
<td>Winter</td>
<td>Okimoto</td>
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<td>2223M.</td>
<td>Seminar: Political Economy of Post-Communism</td>
<td>5</td>
<td>Spring</td>
<td>McFaul</td>
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<tr>
<td>224.</td>
<td>Seminar: States and Markets in Development</td>
<td>5</td>
<td>Spring</td>
<td>Packenham</td>
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<tr>
<td>241.</td>
<td>Seminar: Issues in International Political Economy</td>
<td>5</td>
<td>Winter</td>
<td>Goldstein</td>
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<tr>
<td>243B.</td>
<td>Seminar: Theoretical Issues in International Security</td>
<td>5</td>
<td>Spring</td>
<td>Gaubatz</td>
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<tr>
<td>245R.</td>
<td>Seminar: The Transformation of Europe</td>
<td>5</td>
<td>Winter</td>
<td>Rice</td>
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<tr>
<td>246J.</td>
<td>Seminar: The Organization of the Contemporary World System—Political Economy and Culture</td>
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<td>Winter</td>
<td>Okin</td>
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<tr>
<td>267.</td>
<td>Gender, Development, and Women’s Organizing in International Perspective</td>
<td>5</td>
<td>Spring</td>
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<tr>
<td>201.</td>
<td>Theories of International Cooperation and Conflict</td>
<td>4</td>
<td>Spring</td>
<td>Bueno de Mesquita</td>
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<td>42.</td>
<td>Philosophy of Religion</td>
<td>4</td>
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<td>173.</td>
<td>Religion in the Age of Reason</td>
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<td>Winter</td>
<td>Sockness</td>
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<td>110.</td>
<td>Ethics and Public Policy</td>
<td>5</td>
<td>Winter</td>
<td>McGinn</td>
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<td>279.</td>
<td>Technology Policy and Management in Newly-Industrializing Countries</td>
<td>2-4</td>
<td>Fall</td>
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<td>116.</td>
<td>Comparative Sociology: Successor States of Soviet Union</td>
<td>5</td>
<td>Winter</td>
<td>Titma</td>
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<td>217.</td>
<td>China’s Social Transformation</td>
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<td>Winter</td>
<td>Walder</td>
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</tbody>
</table>

**Independent Study/Honors**

Students must obtain section numbers for courses 197 and 198A,B,C from the International Relations office before enrolling.
197. Directed Study in International Relations
3-5 units, any quarter (Staff)

198A,B,C. Senior Thesis I, II, III—Open only to declared International Relations majors with approved senior thesis proposals.
3-7 units, any quarter (Staff)

198H. Honors Thesis Colloquium—Open only to declared International Relations majors with approved senior thesis proposals.
2 units, Aut, Win, Spr (Goldstein)

OVERSEAS STUDIES

These courses are approved for the International Relations major and taught at the campus indicated. Students should discuss with their major advisors which courses would best meet educational needs. Course descriptions can be found in the “Overseas Studies” section of this bulletin or in the Overseas Studies Program Office, 126 Sweet Hall.

For information on Track (cluster) designations, please consult the updated Course Offering Lists available in the International Relations Program Office, and the quarterly University Time Schedule.

BERLIN
The History of German and European Economic Philosophy—(Enroll in Economics 100X.)
4-5 units, Spr (Krüger)

The Political Economy of Contemporary Germany—(Enroll in Economics 127X.)
4-5 units, Aut (Krüger)

Transition in Germany and Eastern Europe—(Enroll in Economics 128X.)
4-5 units, Win (Krüger)

Culture and Politics in Modern Germany—(Enroll in German Studies 177A.)
4-5 units, Win (Kramer)

Nationalism and Political Culture in Contemporary Germany—(Enroll in German Studies 177B.)
4 units, Spr (Tempel)

European Integration—(Enroll in Political Science 119X.)
4-5 units, Win (Jachtenfuchs)

Environmental Policy in Europe—(Enroll in Public Policy 122P.)
4-5 units, Aut (Jakobeit)
Spr (Bedarff)

FLORENCE
The Political Economy of Industrial Change: Italy and Europe in a Global System—(Enroll in Economics 159X.)
5 units, Win (Bellini)

Italian Politics since 1989 in its International Context—(Enroll in History 233V.)
4-5 units, Win (Benvenuti)

The Integration of Europe—(Enroll in Political Science 145X.)
4-5 units, Aut (D’Alimonte)

4-5 units, Spr (Kume)

MOSCOW
Economic Reform and Economic Policy in Modern Russia—(Enroll in Economics 120X.)
5 units, Aut (Mau)

Russian Politics—(Enroll in Political Science 119X.)
5 units, Aut (Bratersky)

OXFORD
African History through the African Novel: Tropical Africa 1914-1994—(Enroll in English 146V.)
5 units, Aut (Kirk-Greene)

European Imperialism and the Third World, 1870-1970—(Enroll in History 141V.)
5 units, Spr (Darwin)

From Decolonization to Democratization, 1965-1995: Britain and Africa in the Postcolonial Era—(Enroll in History 142V.)
5 units, Win (Kirk-Greene)

Race and Ethnicity in Modern Britain—(Enroll in Political Science 111X.)
3 units, Spr (Lustgarten)

PARIS
20th-Century French and European Economies—(Enroll in Economics 122X.)
5 units, Aut (Balleix)

The Left in Europe—(Enroll in Political Science 121X.)
4 units, Win (Lazar)

New Factors in World Affairs as Challenges to Foreign Policy: The Case of French-African Relationship—(Enroll in Political Science 131X.)
4-5 units, Aut (Charillon)

PUEBLA
Race and Ethnicity in Mexico—(Enroll in Anthropology 151X; same as Overseas Studies 108X.)
5 units, Win (Shadow)

Political Change in Contemporary Mexico—(Enroll in Latin American Studies 106X.)
5 units, Win (Morales)
Developmental Macroeconomics: The Mexican Case—(Enroll in Economics 118X; same as Overseas Studies 114X.)
5 units, Win (Cardenas)

SANTIAGO
Latin America in the International Economy—
(Enroll in Economics 163X.)
5 units, Win (Ffrench-Davis)

Modernization and Culture in Latin America—
(Enroll in Latin American Studies 120X.)
5 units, Aut (Subercaseaux)

Latin America in the International System—
(Enroll in Latin American Studies 129X.)
4-5 units, Win (Rojas)

The interdisciplinary Program in Jewish Studies investigates all aspects of Jewish life in history, literature, language, and culture from biblical times to the present. Courses are offered on the undergraduate and graduate levels in a program complemented by a full range of guest lectures, conferences, and symposia. The program annually sponsors the Donald and Robin Kennedy Undergraduate Award for the best undergraduate essay on any theme in Jewish studies, and it coordinates the annual Dorot Travel Grants for summer study in Israel.

Graduate students enroll in the program through the departments of English, History, or Religious Studies and must meet the requirements of those departments.

UNDERGRADUATE PROGRAMS

INDIVIDUALLY DESIGNED MAJOR

The Individually Designed Major in Jewish Studies permits interested students to focus their attention on the broad field of Jewish Studies and, at the same time, to expand their knowledge of one or another related field.

Each major should complete at least 60 units, all in courses at or above the 100 level (or their equivalent). A maximum of 15 of these 60 units may be taken on a Credit/No Credit basis. A maximum of 5 of these 60 units may be taken in individual study or directed reading. Students must present evidence that demonstrates their ability to do independent work and have at least three full quarters of undergraduate work remaining at Stanford after the date on which the proposal is approved by the committee. Each major must obtain sponsorship from three faculty members, one of whom is the student’s primary adviser, and from the Director of the Program in Jewish Studies. Details about the written procedures and documents necessary for application for an Individually Designed Major can be obtained at the Undergraduate Advising Center, Sweet Hall, first floor (650) 723-2426.

REQUIREMENTS

The faculty members in Jewish Studies have designed the following structure for the major.

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<td>students must take one course in</td>
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<td>each of the three periods—biblical</td>
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<td>and ancient, medieval and modern,</td>
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<tr>
<td>and contemporary</td>
<td>15</td>
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<td>Religion:</td>
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<td>biblical, rabbinic, medieval,</td>
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<td>modern</td>
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<td>Literature:</td>
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<td>Hebrew, Yiddish, Holocaust,</td>
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<td>American Jewish</td>
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<tr>
<td>Hebrew Language (second year or</td>
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<td>beyond): Students who demonstrate</td>
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<td>by examination that they have</td>
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<td>completed the equivalent of at</td>
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<td>least two years of university-level</td>
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<td>Modern Hebrew may apply the 12</td>
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<td>units required in this category</td>
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<td>to more work in one or the other</td>
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<td>categories required by the major,</td>
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<td>with the approval of their</td>
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<td>primary adviser.</td>
<td>12</td>
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<td>Ancillary Courses: ancient history,</td>
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<td>Medieval history, modern European</td>
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<tr>
<td>history of philosophy, Islam,</td>
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<td>Christianity</td>
<td>8-10</td>
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<td>Total number of units required</td>
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<td>........................................</td>
<td>60-62</td>
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</table>

Students planning an Individually Designed Major in Jewish Studies are also strongly urged to write an honors thesis. Students interested in majoring in Jewish Studies should discuss this with their adviser(s) when discussing the major itself. Up to 10 honors thesis units may be included in the major.

No course proposed for the major may be counted as fulfilling more than one required category in the proposed major. Transfer credits from other universities must be approved by the appropriate Stanford authorities.

MINORS

The Jewish studies minor is open to students in any department who wish to enrich their studies through an acquisition of knowledge in Jewish history, thought, religion, literature, and society. Students must complete their declaration of the minor no later than the last day of the quarter four quarters before degree conferral. For example, a student graduating in June (Spring Quar-
must declare the minor no later than the last day of Spring Quarter of the junior year.

Students must complete six courses for a maximum of 36 units toward the minor. All courses of study should be discussed and approved by a Jewish studies faculty member in the departments of History, Religious Studies, or English. In addition to suggested introductory courses, students are also encouraged to take courses in Hebrew language as part of their Jewish studies minor, and are granted credit toward the minor for up to 5 units of language study. Any variations on the minor requirements must be approved in advance by the Director of the Program in Jewish Studies.

Courses credited toward the minor must be distributed in the following way: (1) three introductory courses at the 100 level or below in the fields of history, religious studies, literature or Hebrew language (for a maximum of 5 units)—students may also substitute one of the designated introductory-level courses offered through the Program in Comparative Studies in Race and Ethnicity if they choose; (2) two courses at the 100 level or above from two of three areas of concentration (history, religious studies, or literature); and (3) one seminar or undergraduate colloquium at the 200 level or above in one area of concentration (history, religious studies, or literature.) No course credited toward the Jewish studies minor may be double counted toward major requirements.

**HONORS PROGRAM**

The Jewish Studies honors program fosters a sustained examination of the field of Jewish studies for students majoring in any discipline, and it extends its concerns across broad interdisciplinary terrain, with implications beyond the humanities in areas such as psychology, law, business, and international relations. Students may apply for entry, at the latest, by the Autumn Quarter of their junior year, and must have a cumulative grade point average (GPA) of ‘B’ or higher.

Each student is required to take a lower-division 5-unit “Jewish Civilization” survey co-taught by a cross-section of the faculty in Jewish Studies from the departments of English, History, and Religious Studies, with the cooperation of faculty in American Studies, Feminist Studies, and Russian Studies. This course is designed to provide honors students and others with a broad grasp of the variety and conflicting approaches to Jewish studies. In addition, students are required to take two 5-unit courses chosen from offerings in English, History, or Religious Studies. Students are urged to take at least one course in Jewish history from the survey offered in the Department of History (188A,B,C). Jewish studies honors students are required to write an honors thesis during Autumn and Winter Quarters of the senior year. An honors seminar is offered for students to share their work-in-progress. Thesis proposals are submitted to the Faculty Advisory Committee at least one year prior to the intended date of graduation.

**COURSES**

**ENGLISH**

164B. Imagining the Holocaust  
Spr (Felstiner)

**HISTORY**

85Q. Stanford Introductory Seminar: Jews and Muslims—Preference to sophomores.  
Spr (Rodrigue)

86S. Sources and Methods Seminar: Jewish Women in the 20th Century  
Win (Spiegel)

137. The Holocaust  
Aut (Rodrigue)

207. Undergraduate Colloquium: Intolerance or Symbiosis? Judaism, Christianity, and Islam  
Win (Miller)

285A. Undergraduate Colloquium: Problems in Israeli History—The National Identity and Political Culture of the Israeli State  
Aut (Mancall)

288/388. Undergraduate/Graduate Colloquium: Palestine and the Arab-Israeli Conflict  
Spr (Beinin)

384A. Graduate Core Colloquium in Jewish History, 17th-19th Centuries  
Aut (Rodrigue)

485B. Graduate Research Seminar in Modern Jewish History  
Win, Spr (Rodrigue)

**LITERATURES, CULTURES AND LANGUAGES, DIVISION OF**

128A,B,C. Beginning Hebrew  
Aut, Win, Spr (Berman)

129A,B,C. Intermediate Hebrew  
Aut, Win, Spr (Berman)

130A,B,C. Advanced Hebrew  
Aut, Win, Spr (Berman)

**RELIGIOUS STUDIES**

15. The Hebrew Bible: Issues of Power  
Win (Bach)

23. Introduction to Judaism  
Win (Lawee)

134. The Bible in Fiction; Fiction in the Bible  
Aut (Bach)

171. Faith and Politics in the Middle Ages  
Spr (Lawee)
226. Back to the Sources: Close Readings of Classical Jewish Texts  
Win (Lawee)

321. Graduate Seminar in Modern Judaism  
Spr (Eisen)

323. Medieval Jewish Biblical Exegesis  
Aut (Lawee)

COMPARATIVE STUDY IN RACE AND ETHNICITY, PROGRAM IN

The following courses are designated for the Jewish Studies minor under the Program in Comparative Study in Race and Ethnicity.

ANTHROPOLOGY
151B. Theories of Race and Ethnicity: A Comparative Perspective  
Win (Yanagisako)

HISTORY
164. Introduction to Race and Ethnicity in the American Experience  
Spr (Camarillo, Fredrickson)

CENTER FOR LATIN AMERICAN STUDIES

Chair of the Committee and Director of the Center: Terry Karl  
Associate Director: Kathleen B. Morrison

Affiliated Faculty:  
Anthropology: Clifford Barnett, George Collier, Jane Collier, William Durham, James Fox, John W. Rick, Renato Rosaldo  
Biology: David Ackerly, Paul Ehrlich, Harold Mooney, Peter Vitousek  
Dance: Susan Cashion  
Economics: Donald Harris, Anne Krueger, Ronald McKinnon  
Education: Martin Carnoy, Henry Levin, Amado Padilla  
History: Albert Camarillo, Stephen Haber, Noel Maurer, John D. Wirth  
Latin American Studies: Kathleen Morrison  
Law, School of: John Barton, Thomas Heller  
Linguistics: Shirley B. Heath, John Rickford  
Medicine, School of: Yvonne Maldonado, Julie Parsonnet, Gary Schoolnik, Peter M. Small  
Political Science: Terry Karl, Robert Packenham, Philippe Schmitter  
Spanish and Portuguese: Claire Fox, Mary Pratt, Michael Predmore, Richard Rosa, Jorge Ruffinelli, Guadalupe Valdés  
Visiting Professors: Milton Santos, José Sarukhán

The Center for Latin American Studies coordinates the University's teaching, research, and extracurricular activities related to Latin America.

Field research, language training, and interdisciplinary approaches are stressed in the Latin American Studies Program, which draws on the strength and diversity of its nationally recognized faculty affiliates and substantial library holdings on Latin America. These resources are enhanced by the Tinker Visiting Professorship in Latin American Studies and the Nabuco Visiting Chair in Brazilian Studies, which bring distinguished Latin American academics to teach at Stanford each year. The center is a U.S. Department of Education Title VI National Resource center for Latin American Studies.

The principal programs administered by the center (the bachelor's degree, the honors certificate program, summer field research grants, the master's degree, and concurrent degrees with the Schools of Business, Education, Law, and Medicine) are described below. For further information, contact the Center for Latin American Studies, Bolivar House, 582 Alvarado Row, Stanford University, Stanford, California 94305-8545; phone (650) 723-4444. Consult the center's Web site for updated information including course offerings and public programs: www-leland.stanford.edu/group/las.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The A.B. in Latin American Studies (LAS) offers qualified undergraduates the opportunity to pursue an individualized, interdisciplinary study of Latin America, culminating in the preparation of a senior honors thesis written under the guidance of a faculty sponsor.

To declare a major in Latin American Studies, a student must apply to the center's Subcommittee on Undergraduate Programs no later than the beginning of the second quarter of the junior year; exceptions are made only in unusual circumstances. Requirements for the major include the following:

1. Completion of a coherent interdisciplinary program of at least 55 units, based on an individualized plan of study achieved in consultation with the student's adviser and approved by the center's Subcommittee on Undergraduate Programs. The curriculum ordinarily includes:
   a) At least two courses (10 units) surveying Latin America comprehensively, whether historically, from the perspective of a discipline, or in an explicitly interdisciplinary framework. Appropriate courses are Anthropology 103, Economics 123, History 177, Latin American Studies 80, Political Science 113A.
b) At least five courses (25 units) focused on a theoretical problem or disciplinary approach.

c) Up to 15 units (LAS 169 or 198) devoted to work on the senior research paper (see item 3 below).

d) Remaining courses must be at the 100-level or higher and focus directly on Latin America.

First- or second-year language courses may not be counted toward the 55 units. Only 10 units of Satisfactory/No Credit work may be counted towards the major.

2. Demonstration of language competency in either Spanish or Portuguese at least equivalent to satisfactory completion of courses in grammar and composition at the third-year level of university training (for example, Spanish 201 and 202), or any course taught in Spanish at the third-year level of university training (for example, Spanish 131B, 160, or 161). Alternatively, certification from the Department of Spanish and Portuguese of oral language proficiency at the advanced level on the scale of the American Council for the Teaching of Foreign Languages. Portuguese 109, Portuguese for Students of Spanish, is strongly recommended for those students demonstrating competency in Spanish.

3. Field experience in Latin America (study abroad, summer research, internship, and so on).

4. Submission in the senior year of a research paper of acceptable quality on a topic approved by the Subcommittee on Undergraduate Programs and written under the guidance of a faculty sponsor.

The A.B. in Latin American Studies is an honors program by design. Satisfactory completion of the program, including a grade point average (GPA) of "B+" or better in course work for the major and submission of a senior research paper of honors quality, earns the designation of Honors in Latin American Studies. If these criteria are not met, the degree is awarded without the honors designation.

MINORS

The minor in Latin American Studies is offered for students who wish to develop a regional focus through course work, but without undertaking an honors research project. To pursue the minor, students must declare their intention no later than the second quarter of their junior year. The minor must be completed by the second quarter of their senior year. Requirements for the minor include:

1. Completion of 25 units as follows: a 5-unit course surveying Latin America, for example, LAS 80 or an approved substitute; 20 additional units at the 100-level or higher which together comprise a coherent focus on a theoretical problem or issue of the region, for example, culture and identity, political economy, sustainable development. At least 10 of the total 25 units must be completed at Stanford.

2. Demonstration of proficiency in either Spanish or Portuguese, equivalent to the requirement for the major and honors certificate.

3. Field experience in Latin America (study abroad, summer research, internship, and so on) is recommended. Upon satisfactory completion of all requirements, the center’s Subcommittee on Undergraduate Programs authorizes the designation of the Minor in Latin American Studies on the student’s transcript.

HONORS CERTIFICATION FOR MAJORS IN OTHER DEPARTMENTS OR PROGRAMS

As distinguished from honors for majors in Latin American Studies, Honors Certification in Latin American Studies is intended to complement study in any conventional major. The aim of certification is to enable the student to pursue a foreign area focus through interdisciplinary course work and individualized research on Latin America, culminating in the preparation of a senior honors thesis written under the guidance of a faculty sponsor.

The Honors Certification program is of particular interest to students in any discipline who plan further study or a career with an international or foreign-area focus. Students in the humanities, social sciences, or natural sciences may wish to enrich their studies by acquiring a first-hand understanding of a related aspect of Latin American life.

ADMISSION

To pursue the Honors Certification program, students must apply to the Subcommittee on Undergraduate Programs no later than Autumn Quarter of the junior year. The application includes a proposed plan of course work and tentative thesis topic.

REQUIREMENTS

1. Completion of a coherent interdisciplinary program of at least 25 units, based on an individualized plan of study achieved in consultation with the student’s adviser and approved by the center’s Subcommittee on Undergraduate Programs. The curriculum ordinarily includes:

a) At least one course (5 units) surveying Latin America comprehensively, whether historically from the perspective of a discipline, or in an explicitly interdisciplinary framework. Appropriate courses are Anthropology 103, Economics 123, History 177, Latin American Studies 80, and Political Science 113A.
b) At least four additional courses (20 units) in 100-level courses or higher, focusing directly on Latin America. First- or second-year language courses may not be counted toward the 25 units. Only 5 units of Satisfactory/No-Credit work may be counted toward the program.

2. Demonstration of language proficiency in either Spanish or Portuguese at least equivalent to satisfactory completion of courses in grammar and composition at the third-year level of university training (for example, Spanish 201 and 202), or any course taught in Spanish at the third-year level of university training (for example, Spanish 131B, 160, or 161). Alternatively, certification from the Department of Spanish and Portuguese of oral language proficiency at the advanced level on the scale of the American Council for the Teaching of Foreign Languages.

3. Field experience in Latin America (study abroad, summer research, internship, and so on).

4. Submission in the senior year of a research paper of acceptable quality on a topic approved by the Subcommittee on Undergraduate Programs and written under the guidance of a faculty adviser. Up to 15 units may be given for preparation of the senior paper, but these units do not count toward item "1."

Honors Certification in Latin American Studies is recommended for students who have achieved an GPA of 'B+' or better in their course work for Latin American Studies and have submitted a senior research paper judged to be of honors quality by the student's faculty sponsor and the Subcommittee on Undergraduate Programs.

SUMMER FIELD RESEARCH

Each summer the center awards research grants to a small number of undergraduates to conduct individual research projects in Latin America. Students must have demonstrated the ability to work independently and must possess the necessary language competence. Applications must include a research proposal that has been reviewed and endorsed by a faculty member who agrees to serve as sponsor. A course in research design, Latin American Studies (LAS 165), is required the Spring Quarter before departure. Students from all departments are eligible to apply.

GRADUATE PROGRAMS

MASTER OF ARTS

The Latin American A.M. program is designed for: (1) students who wish to pursue an interdisciplinary approach to the study of Latin America before continuing on to a relevant doctoral program in one of the social sciences or humanities, and (2) individuals who wish to add graduate-level expertise in Latin American Studies to other training necessary for careers in business, journalism, government, or one of the professions.

Minimum qualifications for admission include the equivalent of an A.B. or a B.S. degree, training in at least one of the social sciences, and a working knowledge of Spanish or Portuguese. Successful applicants are also expected to have completed previous course work on Latin America and to have field experience in the region. Applicants must also take the General Test of the Graduate Record Examination (GRE) and have the results sent to Graduate Admissions, Office of the Registrar. Candidates whose native language is not English and who have not studied in an English-speaking institution for at least one and one-half years must take the Test of English as a Foreign Language (TOEFL). Deadline for submission of applications for admission and financial aid is January 1. Admission is normally granted only beginning in Autumn Quarter.

The student's program is worked out in consultation with the associate director of the center who serves as the primary academic adviser on matters related to course work and degree requirements. In addition, the student prepares an interdisciplinary research paper under the guidance of a faculty sponsor.

1. Nine courses with a minimum of 40 units. Only courses at the 100 level or above count for the 40 units. At least eight of the nine courses must be basically Latin American in content. Normally, all courses are taken for a letter grade and distributed as follows:

   a) Core Seminar (LAS 250, 251, 252)—an interdisciplinary course required of all A.M. candidates in Latin American Studies. Fifteen units; 5 per quarter.

   b) Latin American Bibliography (LAS 260) required of all A.M. candidates in Latin American Studies, 3 units.

   c) Three or four courses that qualify as graduate level and focus on a theoretical problem or disciplinary approach.

   d) Two or three courses distributed among other disciplines.

2. Demonstration of language competency in either Spanish or Portuguese at least equivalent to satisfactory completion of courses in grammar and composition at the third-year level of university training (for example, Spanish 201 and 202), or any course taught in Spanish at the third-year level of university training (for example, Spanish 131B, 160, or 161). Alternatively, certification from the Department of Spanish and Portuguese of oral language proficiency at the advanced level on the scale of the American Council for the Teaching of Foreign Languages. Portuguese 109, Portuguese for Students of Spanish, is strongly recommended for students who demonstrate competency in Spanish.
3. An interdisciplinary research paper or project that provides satisfactory evidence of methodological, analytical, research, and writing skills. Students are expected to identify the topic for their paper or project by the onset of Winter Quarter and, under the guidance of a faculty sponsor, develop a bibliography and tentative outline by the end of that quarter. During Spring Quarter, students meet regularly with their faculty sponsors to develop and revise the paper or project which is formally presented to the members of the Core Seminar (LAS 252) at the close of the academic year. The grades assigned for the master’s paper or project count for 10 of the 15 units of the Core Seminar (LAS 251 and 252).

All requirements for the A.M. degree are normally completed in three academic quarters as a full-time student.

CONCURRENT DEGREE PROGRAMS

The Center for Latin American Studies collaborates with the Schools of Business (M.B.A.), Education (M.A.T.), Law (J.D.), and Medicine (M.D.) to allow students to simultaneously pursue concurrent degrees in LAS (A.M.) and the respective professional field. Students must apply to and be independently admitted to both degree programs. For additional information about specific plans of study and degree requirements, contact the Center for Latin American Studies.

DOCTOR OF PHILOSOPHY

Since the University does not offer a Ph.D. in Latin American Studies, students who wish to remain in an academic program at Stanford after completing their A.M. must be accepted by one of the departments offering a Ph.D., with an emphasis on Latin America.

SUMMER FIELD RESEARCH

The Center awards summer research grants for continuing graduate students to conduct individual research projects in Latin America. Separate competitions are held each Spring Quarter in the following categories: predissertation grants for Ph.D. candidates, usually after their second year of study; short-term travel grants for students in any field and at any level of study; professional school research grants for students in the Schools of Business, Engineering, Law, and Medicine; Ayacucho Grants for research in Venezuela; and the H. J. K. Knowles research grants for research on women in Latin America. For additional information, contact the Center for Latin American Studies.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

Latin American Studies courses are also listed under Santiago and Puebla in the "Overseas Studies" section of this bulletin.

In addition to the courses listed here, the faculty affiliated with the center regularly offer over 100 courses related to Latin America in their respective departments and schools. Consult the quarterly Time Schedule for current course offerings or contact the Center for Latin American Studies.

See the respective department section of this bulletin for cross-listed course descriptions.

80/170. Culture, Society, and Politics in Latin America—(Same as History 80.) Introduction to the political and social history of Latin America. Emphasis is on the interaction between institutional change, social structure, and political movements, emphasizing the environment and cultural values. GER:3b,4a (DR:2 or 9) (WIM) 5 units, Win (Wirth)

87Q. Stanford Introductory Seminar: Urbanization, Poverty, and Children in Latin America—Preference to sophomores. Regional issues through the study of street children in Latin America: rural-urban migration patterns, the informal economy and labor sector, human rights, ethnicity and identity, the costs of structural adjustment policies, environmental and other health hazards, the role of public and private institutions, and grassroots mobilization. Disciplinary perspectives on the plight of street children include sociological and demographic profiles; psychological studies; depictions in literature, film, and popular culture; ethnographies; and economic analyses. Case studies of institutional responses. Enrollment limited to 10. 5 units, Spr (Morrison)

115/215. Militaries and Democratization in Latin America—The impact of the armed forces on Latin American politics and society, emphasizing the recent period of democratization. The origins of the Latin American armed forces as an institution, and the role they have played in the cycles of authoritarian and democratic rule which characterized the region. 5 units, Win (Trinkunas)

120. Chilean Studies: Modern Chilean Culture through Music, Film, and Literature 1945-1997—Recommended for students planning to attend the Santiago program and open to all students. Chilean culture and its role in relation to national politics and the development of democratic processes. The history of the New Chilean Song, considering vernacular and institutional cultural forms. The role of
singers as organic intellectuals and their linkages to societal changes.

3-5 units, Spr (Durán)

134. Introduction to Haitian History, Culture and Sociopolitics—Weekly lecture series on issues that have shaped Haiti’s current reality and the roots of its underdevelopment. Topics: the Haitian Revolution, the U.S. military occupations of Haiti, Duvalier and Duvalierism, Vodoun, the Haitian economy, sweatshops and street children, environmental issues, Aristide and democratization, health education, and Haiti’s position in the Caribbean.

2 units, Aut (Staff)

165. Introduction to the Design and Methodology of Interdisciplinary Field Research—Preparation for summer fieldwork in Latin America or other regions. Issues of interdisciplinary research design and methodology; the relationship between evidence and argument; practicalities of field research in developing countries; ethical and political considerations.

5 units, Spr (Staff)

169. Directed Individual Study—(Graduate students register for 269.) For students engaged in special interdisciplinary work that cannot be arranged by department.

1-5 units, Aut, Win, Spr (Staff)

182. Seminar: The United States and Central America—(Same as Political Science 126K.) The crisis of development in Central America and the challenge it poses for U.S. policy towards Latin America. Emphasis is on the historic roots of the crisis and the emergence of specific policy dilemmas in the issue areas of democratization, national security, and human rights.

5 units (Karl) not given 1997-98

191/292. Latin American Urbanization in the Second Half of 20th Century—The relationships between post-WW II development in Latin America and the process of urbanization and metropolization. Emphasis is on economic, demographic, social, and geographic changes within this period.

5 units, Win (Santos)

195. Perspectives on Sustainable Development in Latin America—Cross-disciplinary examination of perspectives for “sustainable development” in rural areas of Latin America. Interactions between poverty, development, environmental degradation, and approaches to growth and sustainability as agroecology, agroforestry, small farm development, and conservation biology. Limited enrollment.

5 units, Win (Rosset)

197A.B. Workshop on Brazil—(Same as Political Science 226A,B.)

5 units (Schmitter) not given 1997-98

198. Senior Thesis—Restricted to undergraduate majors and those writing the honors thesis in Latin American Studies.

1-10 units, Aut, Win, Spr (Staff)

200. Seminar: Research on Latin America—(Same as Political Science 222K.) Restricted to graduate students and undergraduates preparing senior honors theses after research in Latin America. Develop and present research and prepare a field paper. Prerequisite: consent of instructor.

5 units (Karl) not given 1997-98

211. Political Economics of Development: Latin America in International and Historical Perspective

5 units, Spr (A. Taylor)

234. Ecology and Biodiversity of Mexico—The ecology and vegetation of Mexico and the factors that determine its high biological diversity, uses, sustainability and relations to cultural diversity, national policies, and efforts towards the study and conservation of biodiversity.

5 units, Aut (Sarukhán)

235. Comparative Conservation Strategies in Latin America—Current projects in biodiversity and ecological conservation in Latin America (e.g., INBIO, CONABIO) and comparative strategies in Australia and Canada.

5 units, Spr (Sarukhán)

250,251,252. Core Seminar in Latin American Studies—Restricted to A.M. degree students, or consent of instructor. Interdisciplinary analysis of topics and issues related to the Latin American region. Autumn includes bibliographical resources.

250. 5 units, Aut (Staff)

251. 5 units, Win (Karl, Morrison)

252. 5 units, Spr (Staff)


1 unit, Win (Duus, R. Roberts, Kollmann)

390. Workshop: Program in Restoration Ecology—In-depth exercise to develop graduate-level curriculum in restoration ecology for training Latin American natural and social scientists.

3-5 units, Win (Sarukhán)

AFFILIATED DEPARTMENT OFFERINGS

See respective department listings for course descriptions and General Education Requirement (GER) information.

ANTHROPOLOGY

3. Human Prehistory

3-5 units, Aut (Rick)
73A,B,C. First-Year Course in an Indigenous Language of Latin America
4 units (Fox) not given 1997-98

74A,B,C. Second-Year Course in an Indigenous Language of Latin America: Quiche Mayan
4 units (Fox) not given 1997-98

93. Prefield Research Seminar
5 units (Olson)

94. Postfield Research Seminar
5 units (Rosaldo)

98A. Maya Mythology Multimedia Project
5 units (Fox) not given 1997-98

109. Dance and Culture in Latin America
3-4 units (Cushion)

110B. Disrupting the Border: Mexican Migration and the Reconceptualizations of Latin American and Chicano Studies
5 units (De Genova)

133A,B,C. Ethics of Development in a Global Environment (EDGE)—(Same as Engineering 297A,B,C.)
1-4 units (Gupta, Lusignan)

151A. Comparative Cultural Studies
5 units (Ebron) not given 1997-98

151B. Theories of Race and Ethnicity: A Comparative Perspective
5 units (Yanagisako)

164. Ecological Anthropology—(Same as Human Biology 134.)
3-5 units (Durham) not given 1997-98

168. Medical Anthropology
5 units (Barnett)

169/269. Community Based Conservation
3-5 units (Charnley)

173. Maya Hieroglyphic Writing
5 units (Fox) not given 1997-98

181/281. Evolutionary Anthropology—(Same as Human Biology 181.)
5 units (Durham) not given 1997-98

185/285. Stone Tools in Prehistory
5 units (Rick)

187/287. Hunter-Gatherers in Archeological Perspective
5 units (Rick) not given 1997-98

189. Incas and their Ancestors: Peruvian Archaeology
5 units (Rick)

5 units (De Genova)

243. Culture as Commodity
5 units (Ebron)

251. Issues in Cultural Studies
5 units (Rosaldo)

251B. Cultural Citizenship
5 units (Rosaldo)

257. Law and Culture
5 units (Collier)

262. Topics in Political Economy
5 units (Gupta) not given 1997-98

262A. Political Economy and Social Relations: Anthropological Problems of Representations and Critique
5 units (De Genova)

263. Political Ecology
5 units (Durham) not given 1997-98

264. Advanced Ecological Anthropology
5 units (Durham) not given 1997-98

273. Seminar in Advanced Medical Anthropology
5 units (Barnett)

BUSINESS

301. International Economics and Policy Analysis
5 units (Wells)

323F. International Financial Management
4 units (Werner)

DANCE

42. Dances of Latin America
1 unit (Cashion)

43. Afro-Brazilian and Afro-Peruvian Dance
1 unit (Cashion)

75. Mexican Dance and Folklore
2 units (Cashion)

105. Grupo Folklorico Los Decanos
1 unit (Cashion)

168. Dance and Culture in Latin America
3-4 units (Cashion)

240. Society, Education, and Dance
4-5 units (Cashion, Ross)

ECONOMICS

99. Stanford Introductory Seminar: State, Market, and Development
5 units (Meier)

106. The World Food Economy—(Same as Food Research 103/203.)
5 units (Falcon, Naylor)

118. The Economics of Development
5 units (Kochar)

122. The Theory of Capitalist Development
5 units (Harris)

165. International Economics
5 units (Gilfedder, Desmet)
215. Industrialization, Market Emergence, and Economic Development
5 units (Fatchamps)

217. Money and Finance in Economic Development
5 units, not given 1997-98

219. Value, Distribution, and Accumulation
5 units, not given 1997-98

265. International Finance
5 units (McKinnon)

266. International Trade Theory
5 units (Krueger)

267. Special Topics in International Economics
5 units (Krueger)

315A,B,C. Workshop in Economic Development
10 units (Staff)

365A,B,C. Workshop in International Economics
10 units (Staff)

EDUCATION

197. Education and the Status of Women: Comparative Perspective
4-5 units (Ramirez)

202X. Introduction to Comparative and International Education
4-5 units (Mundy, Carnoy, Ramirez)

206A. Applied Research Methods in Comparative Education I: Introduction
1-2 units (Chabbott)

206B. Applied Research Methods in International and Comparative Education II
3-5 units (Chabbott)

207. Seminar: The Politics of International Cooperation in Education
3-4 units (Mundy)

283. Attitudes toward Languages and Language Study
4 units (Padilla)

287. Culture and Learning—(Same as Anthropology 136.)
3 units (Baugh, McDermott)

306A. Education and Economic Development
5 units (Carnoy)

306B. Education and Political Change
4-5 units (Mundy)

306C. Cultural Approaches to Education and Development
5 units (McDermott)

306D. World, Societal, and Educational Change: Comparative Perspectives
5 units (Ramirez)

335X. Language Policy and Planning: National and International Perspectives
3 units (Fishman) not given 1997-98

376. Education and Theories of the State
5 units (Carnoy) not given 1997-98

387A,B,C. Workshop: Comparative Systems
2-5 units (Ramirez, Meyer)

406X. Topics in Comparative Educational Research
2-3 units (Ramirez) not given 1997-98

408. Research Workshop in International and Comparative Education
2-5 units (Carnoy)

HISTORY

80S. Sources and Methods Seminar: Cultural Encounters in the Andes, 1532 to the Present
5 units (Garcia-Bryce)

162. Introduction to Chicano History and Culture—(Same as English 124C.)
5 units (Camarillo, Moya)

179. History of Mexico
5 units (Maurer)

180. 20th-Century Brazil
5 units (Wirth)

276/376. Colloquium: The Creation of North America
5 units (Wirth) not given 1997-98

278. Undergraduate Colloquium: Modern Mexico
5 units (Maurer)

280. Undergraduate Colloquium: Modern Mexico
5 units (Maurer)

4-5 units (Maurer)

476. Graduate Seminar on Brazil
4-5 units (Wirth) not given 1997-98

478. Graduate Seminar: Economic and Social History of Latin America
4-5 units (Haber) not given 1997-98

HUMAN BIOLOGY

2A. Genetics, Evolution, and Ecology
5 units (Boggs)

POLITICAL SCIENCE

35. International Politics
5 units (Krasner)

113P. Political Economy of Latin American Development
5 units (Packenham)

117H. Peasant Politics
5 units (Staff)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Offered</th>
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<tbody>
<tr>
<td>124</td>
<td>Seminar: States and Markets in Latin American Development</td>
<td>5</td>
<td>Packenham not given 1997-98</td>
</tr>
<tr>
<td>138</td>
<td>International Security in a Changing World</td>
<td>5</td>
<td>Blacker, May, Perry, Sogan</td>
</tr>
<tr>
<td>195</td>
<td>The Politics of Immigration</td>
<td>5</td>
<td>Wong</td>
</tr>
<tr>
<td>212P</td>
<td>The Politics of International Cooperation and Regional Integration</td>
<td>5</td>
<td>Schmitter not given 1997-98</td>
</tr>
<tr>
<td>215</td>
<td>Graduate Seminar Environmental Politics in the Asia/Pacific Region</td>
<td>5</td>
<td>Oksenberg</td>
</tr>
<tr>
<td>216H</td>
<td>Seminar: Social Movements and Political Change</td>
<td>5</td>
<td>Staff</td>
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<tr>
<td>224</td>
<td>Seminar: States and Markets in Development</td>
<td>5</td>
<td>Packenham</td>
</tr>
<tr>
<td>227</td>
<td>Seminar: Democratization—East, West, and South</td>
<td>5</td>
<td>Schmitter not given 1997-98</td>
</tr>
<tr>
<td>227D</td>
<td>Seminar: Consolidating Democracy</td>
<td>5</td>
<td>Diamond given 1998-99</td>
</tr>
<tr>
<td>234B</td>
<td>International Institutions</td>
<td>5</td>
<td>Goldstein given 1998-99</td>
</tr>
<tr>
<td>243A</td>
<td>Graduate Seminar: International Relations Theory</td>
<td>5</td>
<td>Krasner</td>
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<tr>
<td>243C</td>
<td>Seminar: Theoretical Issues in International Political Economy</td>
<td>5</td>
<td>Goldstein</td>
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<tr>
<td>267</td>
<td>Gender, Development, and Women's Organizing in International Perspective</td>
<td>5</td>
<td>Okin</td>
</tr>
<tr>
<td>313P</td>
<td>Seminar: Political Economy of Latin American Development</td>
<td>5</td>
<td>Packenham</td>
</tr>
<tr>
<td>324</td>
<td>Seminar: Institution and Development</td>
<td>5</td>
<td>Packenham</td>
</tr>
<tr>
<td>340</td>
<td>Seminar: New Approaches to International Security</td>
<td>5</td>
<td>Eden</td>
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**SOCIIOLOGY**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>110/210</td>
<td>Politics and Society</td>
<td>5</td>
<td>Meyer</td>
</tr>
<tr>
<td>231</td>
<td>World, Societal, and Educational Change: Comparative Perspectives—(Same as Education 306D)</td>
<td>5</td>
<td>Ramirez</td>
</tr>
<tr>
<td>311A,B,C</td>
<td>Workshop: Comparative Systems—(Same as Education 387A,B,C)</td>
<td>2-5</td>
<td>Meyer, Ramirez</td>
</tr>
<tr>
<td>333</td>
<td>Social Control and Resistance to it: The Role of Law in Colonialism Projects</td>
<td>5</td>
<td>given 1998-99</td>
</tr>
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</table>

**SPANISH AND PORTUGUESE**

**PORTUGUESE**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Offered</th>
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<tbody>
<tr>
<td>134</td>
<td>Brazilian Cultural Perspectives</td>
<td>4</td>
<td>Staff, de Carvallo</td>
</tr>
<tr>
<td>360E</td>
<td>Modern Brazilian Literature and Culture: City and Culture in Brazil</td>
<td>3-5</td>
<td>Jaguaribe</td>
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**SPANISH**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Offered</th>
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<tbody>
<tr>
<td>160</td>
<td>Spanish American Literature I</td>
<td>3-5</td>
<td>Rosa</td>
</tr>
<tr>
<td>161</td>
<td>Spanish American Literature II</td>
<td>3-5</td>
<td>Fox</td>
</tr>
<tr>
<td>169E</td>
<td>Cultural Dimensions of Globalization</td>
<td>3-5</td>
<td>Fox</td>
</tr>
<tr>
<td>194E</td>
<td>Film and Literature: U.S.-Mexico Border Representations</td>
<td>3-5</td>
<td>Fox</td>
</tr>
<tr>
<td>203</td>
<td>History of the Spanish Language</td>
<td>3-5</td>
<td>Valdés</td>
</tr>
<tr>
<td>205</td>
<td>Dialectology of the Spanish Language</td>
<td>3-5</td>
<td>Valdés not given 1997-98</td>
</tr>
<tr>
<td>206</td>
<td>Spanish use in Chicano Communities</td>
<td>3-5</td>
<td>Valdés not given 1997-98</td>
</tr>
<tr>
<td>207</td>
<td>Theory and Issues in the Study of Bilingualism—(Same as Education 149/249.)</td>
<td>4</td>
<td>Valdés</td>
</tr>
<tr>
<td>242</td>
<td>Puerto Rican Literature: The Elusive Nation</td>
<td>3-5</td>
<td>Rosa</td>
</tr>
<tr>
<td>243</td>
<td>Nuyorican Literature</td>
<td>3-5</td>
<td>Rosa</td>
</tr>
<tr>
<td>245</td>
<td>Latino Narrative</td>
<td>3-5</td>
<td>Rosa</td>
</tr>
<tr>
<td>252</td>
<td>Contemporary Mexican Thought</td>
<td>3-5</td>
<td>Fox</td>
</tr>
<tr>
<td>260</td>
<td>Latin America in the Sixties</td>
<td>3-5</td>
<td>Ruffinelli</td>
</tr>
<tr>
<td>261</td>
<td>The Avant Garde in Latin America</td>
<td>3-5</td>
<td>Ruffinelli</td>
</tr>
<tr>
<td>262</td>
<td>The Origins of the New Latin American Novel</td>
<td>3-5</td>
<td>Ruffinelli</td>
</tr>
<tr>
<td>263</td>
<td>The Latin American Novel of the '60s: Cortázar, Vargas Llosa, García Márquez</td>
<td>3-5</td>
<td>Ruffinelli</td>
</tr>
</tbody>
</table>
264. The Latin American Novel of the '70s: Bryce, P. Rossi, Soriano  
3-5 units (Ruffinelli)

265. The Latin American Novel of the '80s  
3-5 units (Ruffinelli)

268. A New Literary Genre: Testimony  
3-5 units (Ruffinelli)

269. Borges  
3-5 units (Ruffinelli)

280. Introduction to Chicano Literature  
3-5 units (Yarbro-Bejarano)

286. Chicana/o and Latina/o Theater and Performance  
5 units (Yarbro-Bejarano)

294. Latin American Cinema: The Short Story in Film  
3-5 units (Ruffinelli)

295. Cinema, Literature, and Politics in Latin America  
3-5 units (Ruffinelli)

298. Senior Seminar: Pan-Americanism  
3-5 units (Fox)

301. Methods of Teaching Spanish  
3-5 units (Haro)

306E. Introduction to Literary Criticism and Theory: Sociocriticisms  
3-5 units (Pratt)

309E. Criticism and Colonialism  
3-5 units (Pratt)

342. Constructors of Race in 19th-Century Latin America  
3-5 units (Rosa)

343. Argentina from Sarmiento to Walsh  
3-5 units (Ruffinelli)

345. Gauchesca Poetry  
3-5 units (Ruffinelli)

358. The Short Novel of the '60s and '70s in Latin America  
3-5 units (Ruffinelli)

360. Gender, Race, and Nation in 19th-Century Latin America  
5 units (Pratt)

362. Latin American Writing, 1960 to Present: Gender, Authoritarianism, and Resistance  
5 units (Pratt)

369. The U.S.-Mexico Border Region  
3-5 units (Fox)

384. Chicana/o Literature: The Body of Cultural Nationalism  
3-5 units (Yarbro-Bejarano)

389. Queer Raza  
3-5 units (Yarbro-Bejarano)

391. Humor in Latin American Literature  
3-5 units (Ruffinelli)

395E. Transnational Film Production  
3-5 units (Fox)

SCIENCE, TECHNOLOGY, AND SOCIETY

279. Technology Policy and Management in Newly-Industrializing Countries  
2-4 units (Forbes)

OVERSEAS STUDIES

These courses are approved for the Latin American Studies major and taught at the campus indicated. Students should discuss with their major advisers which courses would best meet educational needs. Course descriptions can be found in the "Overseas Studies" section of this bulletin or in the Overseas Studies Program office, 126 Sweet Hall.

PUEBLA

106X. Political Change in Contemporary Mexico  
5 units (Morales)

108X. Race and Ethnicity in Mexico  
5 units (Shadow)

110X. Social and Political Reflections in the Art of Prehispanic Mexico  
5 units (Plunket)

113S. Economics of Emerging Financial Markets—(Same as Overseas Studies 112X.)  
5 units (Castañeda)

114X. Development Macroeconomics: The Mexican Case  
5 units (Cárdenas)

SANTIAGO

116X. Research Seminar in the Humanities: Contemporary Representations of Latin American Society  
5 units (Hurtado)

117X. Research Seminar: Women in Latin American Society  
5 units (Valdés)

118X. Cultural Modernization: The Case of Chile  
5 units (Fuenzalida)

120X. Modernization and Culture in Latin America  
5 units (Subercaseaux)

121X. Social Heterogeneity in Latin America—(Same as Overseas Studies 111.)  
5 units (Valdés)

122X. Man-Environment Interactions: Case Studies from Central Chile—(Same as Overseas Studies 106H.)  
5 units (Hajek)
LINGUISTICS

Emeriti: (Professors) Clara N. Bush, Charles A. Ferguson, Joseph H. Greenberg
Chair: Stanley Peters
Professors: Joan Bresnan (on leave Autumn, Winter), Eve V. Clark (on leave), Penelope Eckert, Shirley Brice Heath (on leave), Martin Kay, Paul Kiparsky (on leave Autumn), William R. Leben, Stanley Peters, John R. Rickford (on leave), Ivan A. Sag, Elizabeth C. Traugott, Thomas A. Wasow
Associate Professor: Peter Sells
Assistant Professors: David Beaver, Edward Flemming
Courtesy Professor: John Baugh
Affiliated Faculty: Herbert H. Clark, Kenji Hakuta, James A. Fox, Yoshiko Matsumoto, Mary L. Pratt, Orrin W. Robinson III, Richard D. Schubbach, Chao-Fen Sun
Senior Lecturers: Philip L. Hubbard, Beverley J. McCchesney
Lecturer: Linda Uyechi
Consulting Professors: Jerry R. Hobbs, Ronald M. Kaplan, Charlotte Linde, Geoffrey Nunberg
Consulting Associate Professors: Mary Dalrymple, Jared Bernstein
Consulting Assistant Professor: Hinrich Schütze
Visiting Professors: Genevieve Escure (Autumn), Arnold Zwicky (Winter)
Visiting Assistant Professor: Shahzad Mahootian (Winter)
Mellon Postdoctoral Fellow: Natalie Schilling-Estes

English for Foreign Students
Director: Beverley J. McCchesney
Associate Director: Philip L. Hubbard
Lecturers: Carole Mawson, Connie Rylance

LINGUISTICS concerns itself with the fundamental questions of what language is and how it is related to the other human faculties. In answering these questions, linguists consider language as a cultural, social, and psychological phenomenon and seek to determine what is unique in languages, what is universal, how language is acquired, and how it changes. Linguistics is, therefore, one of the cognitive sciences; it provides a link between the humanities and the social sciences, as well as education and hearing and speech sciences.

The department offers courses at undergraduate and graduate levels in the areas central to linguistic theory and analysis. Many of them deal with the analysis of structural patterns in the different components that make up language, including sounds (phonetics and phonology), meanings (semantics), words (morphology), sentences (syntax), and the way they change. Other courses integrate the analysis of linguistic structure with phenomena that directly concern other disciplines. These include courses in language acquisition, sociolinguistics, computational linguistics, and the philosophy of language.

A variety of open forums provide for the discussion of linguistic issues, including colloquia and regularly scheduled workshops in phonology, syntax, sociolinguistics, child language, and historical linguistics. Faculty and visiting scholars in the Cognitive Science Group and the Center for the Study of Language and Information, whose members are linguists, philosophers, psychologists, and computer scientists, participate extensively in the activities of the department.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The undergraduate major stresses the study of language both as a fundamental human faculty and as a changing social institution. At the core of the program is a set of departmental courses on the nature of human language; in addition, the major draws on courses offered by other departments and programs.

The Linguistics major cuts across the humanities, social, and physical sciences, and provides a solid general education as a background for advanced studies in such disciplines as anthropology, communication, computer science, education (language, literacy, and culture), hearing and speech sciences, languages, law, linguistics, philosophy, and psychology.

Requirements

Requirements for the A.B. include at least 50 units of course work in linguistics (typically 12 courses plus a seminar) and related fields, including the study of a foreign language. No more than two courses, neither of which can be a core course, may be taken on a Credit/No Credit basis.
Core Courses—The five core courses are:
110. Introduction to Phonetics and Phonology
120. Introduction to Syntax
130. Introduction to Semantics and Pragmatics
150. Language in Society
160. Introduction to Language Change, or a course in Historical Linguistics or the History of a Language. (The historical course must be cross-listed as a Linguistics class.)

Other Courses—Other courses counting toward the unit requirement should form a coherent program and be approved by an adviser. Students should consult with an adviser when declaring the major, and maintain regular contact during the remainder of their Stanford career.

Of the 50 units for the major, 20 come from the five core courses. Students must also take:
1. At least five other courses (minimum 3 units each) taught through Linguistics, including at least two 200-level Linguistics courses
2. The Spring Seminar (Linguistics 97)

Language Requirement—Majors must have competence in at least one language other than English as part of their understanding of the field of linguistics and its study. This is usually demonstrated by the completion of six quarters of language study or equivalent, or by a special examination or other evidence that the student has the required competence. Conversation classes can only be counted towards this requirement with the prior written approval of the student’s adviser. Up to 10 units of credit in language classes may be applied to the credit requirement (50 units) for the Linguistics major. This requirement may be modified for certain areas of specialization, in consultation with the student’s adviser and the Chair of the Undergraduate Studies Committee.

Spring Seminar—The Spring Seminar (Linguistics 97) is offered each year as a 2-unit once-weekly course and is a required part of the Linguistics major. The goal of the seminar is to provide a forum for students to work on a small project that helps define a focus for their linguistic studies at Stanford. Students normally take the seminar in the junior or senior year, and may take it more than once if they wish.

Language Specialization—Students may major in Linguistics while declaring a specialization in a foreign language. Below is a program that has been worked out for Linguistics majors who declare a specialization in French.

Students are subject to the normal requirements for the A.B. in Linguistics, with the following modifications:
1. Three additional courses are required: the introductory series on French literature and culture (French 130, 131, 132).
2. French 272, Pronunciation and Phonetics, may be substituted for Linguistics 110, Introduction to Phonetics and Phonology; French 275, History of the French Language, may be used as the required course in the history of a language.
3. The French section of Linguistics 1, Introduction to Linguistics, is recommended for students specializing in French.

Similar programs involving other languages may be worked out with a Linguistics adviser in consultation with the relevant language department.

MINORS

Requirements for the minor include at least 28 units of course work (typically seven courses) in linguistics and related fields. The minor consists of Linguistics 1, a choice of three out of five core courses, and at least three other courses. After getting acquainted with at least three of the core areas of linguistics, students typically choose to either broaden their view by taking more core courses or take more advanced courses in one core area.

The five core courses are:
110. Introduction to Phonetics and Phonology
120. Introduction to Syntax
130. Introduction to Semantics and Pragmatics
150. Language in Society
160. Introduction to Language Change

In addition to the required three core courses, students must take at least three courses (minimum 3 units each) that are taught through Linguistics (any level, up to and including 200-level courses), cross-listed with Linguistics, or that have sufficient linguistic content (subject to approval by the Linguistics Undergraduate Studies Committee). Students are encouraged to take at least one 200-level Linguistics course. Students may also choose to do independent study with a faculty member of their choice.

Students should work out their individual program in advance, in consultation with a Linguistics undergraduate adviser who should ascertain that the courses chosen are offered during the time of anticipated enrollment. The courses counting towards the minor should form a coherent program, and must be approved by the Linguistics Undergraduate Studies Committee.

HONORS PROGRAM

Students majoring in linguistics who plan to apply for graduate studies in linguistics or related fields should seek departmental honors. An application to pursue honors work should be presented well before the end of the junior year, and approval is given only to students who have maintained a grade point average (GPA) of 'B+' or better in the courses required for the major.

Honors students take a total of 60 units. These must include the core courses and an honors essay based on research conducted with a member of the Linguistics faculty. In the senior year, the student enrolls in Linguistics 99A and B (Inde-
pendent Study) in the Autumn and Winter Quarters, respectively, to work closely with the selected faculty member on the research project. In Spring Quarter, the student enrolls in 98 (Honors Research) with the faculty member for close supervision on the honors essay. The essay must be submitted in final, acceptable form no later than six weeks before the date of intended graduation.

COTERMINAL A.M.

It is possible to earn an A.M. in Linguistics while earning an A.B. or B.S. at Stanford. This is usually undertaken in the fifth undergraduate year. Applications are reviewed as part of the regular graduate admissions process. Applicants must have completed at least 20 units of work in Linguistics before the first Autumn Quarter of A.M. study. The coterminal A.M. requirements are identical to those for the regular A.M. in Linguistics, including 3 residence credits beyond those accumulated for the A.B.

GRADUATE PROGRAMS
MASTER OF ARTS

The University's basic requirements for the master's degree are discussed in the "Graduate Degrees" section of this bulletin. The following are additional departmental requirements. Candidates should review the department's "Guidelines for the A.M. and Ph.D. Degrees" for further particulars concerning these requirements.

1. Courses: candidates must complete a minimum of 40 units of graduate work in linguistics, including at least four courses in the student's area of specialization. No more than two courses should be at the 100 level.

   Individual programs should be worked out in advance with an adviser who should ascertain that the necessary courses in the area of specialization are offered over the course of the year of anticipated enrollment. The overall grade point average (GPA) must be at least 'B' for all grade program course work.

2. Language: reading knowledge of a non-native language in which a substantial linguistic literature is written, with sufficient facility to understand and interpret linguistic research published in that language or in-depth research on the structure of a non-native language. (Particular areas of specialization may require additional research languages.)

   In addition, each candidate must demonstrate an explicit in-depth knowledge of the structure of at least one language (normally neither the candidate's native language nor the language used for the reading exam). This requirement is fulfilled by writing an original research paper on a language.

3. Research: the prospective Ph.D. candidate is expected to complete two substantial qualifying papers. The deadline for completion of the first qualifying paper is the end of the Autumn Quarter of the second year; the deadline for completion of the second qualifying paper is the end of Spring Quarter of the second year. Subject matter of the two papers, although it may be related (for example, same language), must be clearly distinct. The requirement is fulfilled by writing a research paper in up to 6 units of Linguistics 398, Directed Research.

DOCTOR OF PHILOSOPHY

The following requirements are in addition to the basic University requirements for the degree sought; see the "Graduate Degrees" section of this bulletin. Candidates should review the department's "Guidelines for the A.M. and Ph.D. Degrees" for further particulars concerning these requirements.

1. Language: candidates must demonstrate the ability to read at least one foreign language in which a substantial linguistic literature is written, with sufficient facility to understand and interpret linguistic research published in that language. (Particular areas of specialization may require additional research languages.)

   In addition, each candidate must demonstrate an explicit in-depth knowledge of the structure of at least one language (normally neither the candidate's native language nor the language used for the reading exam). This requirement is fulfilled by writing an original research paper on a language.

2. Courses: a minimum of 80 units of graduate work beyond the A.B. or B.S. exclusive of dissertation units or, beyond the A.M., 40 units exclusive of dissertation units. A basic course requirement detailed in the Ph.D. guidelines guarantees that each student covers a sufficient set of subareas within the field.

   Candidates must maintain a satisfactory record in the number and distribution of units completed. The overall course work GPA must be at least 'B,' and all of the "basic" courses should be completed with at least a 'B.'

3. Research: the prospective Ph.D. candidate is expected to complete two substantial qualifying papers. The deadline for completion of the first qualifying paper is the end of the Autumn Quarter of the second year; the deadline for completion of the second qualifying paper is the end of Spring Quarter of the second year. Subject matter of the two papers, although it may be related (for example, same language), must be clearly distinct. The requirement is fulfilled by writing a dissertation in up to 6 units of Linguistics 398, Directed Research.

4. Candidacy: students must complete the basic course requirement (see item 2 above), one foreign language requirement (see item 1 above), and one qualifying paper (see item 3 above) by the end of their second year.

5. Teaching: at least three quarters serving as teaching assistant in a linguistics course; students on University fellowships teach four quarters.

6. Colloquia: two oral presentations exclusive of the oral presentation of the dissertation proposal (see item 7b below). This requirement is satisfied by class presentations, conference papers, or colloquium talks. Normally, both should be given during the first three years of study.

7. Dissertation:

   a) A written dissertation proposal required by the end of the third year
b) Oral presentation of the dissertation propos-
al, preferably as a colloquium
c) Approval of dissertation topic and appoint-
ment of a dissertation committee
d) Successful passing of a University oral ex-
amination on the dissertation project and
related areas
e) Dissertation (up to 15 units of 399)

Ph.D. MINOR
1. Courses: the candidate must complete 30 units
of course work in linguistics at the 100 level
or above, including 110, 120, and 130 (100-
level courses are waived if 200-level courses
in the same area are taken), and at least three
courses related to the area of specialization.
Courses submitted for the minor must be incre-
mental units beyond those used to satisfy the
major. Individual programs should be worked
out in advance with the student's Ph.D. minor
adviser in linguistics.

2. Research Project (optional): the candidate may
elect to present a paper which integrates the
subject matter of linguistics into the field of
specialization of the candidate.

3. The linguistics adviser or designee serves on
the candidate's University oral examination
committee and may request that up to one-third
of the examination be devoted to the minor sub-
ject.

COGNITIVE SCIENCE
Linguistics is participating with the depart-
ments of Computer Science, Philosophy, and
Psychology in an interdisciplinary program in
Cognitive Science for doctoral students. The pro-
gram is intended to provide an interdisciplinary
education as well as a deeper concentration in
linguistics. Students who complete the Linguis-
tics and Cognitive Science requirements receive
a special designation in Cognitive Science along
with the Ph.D. in Linguistics. To receive this field
designation, students must complete 30 units of
approved courses, 18 of which must be taken in
two disciplines outside of linguistics. The list of
approved courses can be obtained from the Cog-
nitive Science program located in the Department
of Psychology.

COURSES
(WIM) indicates that the course meets the Writing
in the Major requirements.

The Department of Linguistics administers the
Program in English for Foreign Students. Course
offerings follow the Linguistics courses listed
below.

LINGUISTICS
Courses with two-digit numbers are primari-
ly for undergraduates. Courses with 100-level
numbers are for advanced undergraduates and
A.M. and Ph.D. minor candidates in Linguistics.
Those with numbers 200 and above are primari-
ly for graduate students, but with the consent of
instructor some of them may be taken for credit
by qualified undergraduates.

At all levels, the course numberings indicate
a special area, as follows:

00-04 General
05-19 Phonetics, Phonology, and Morphology
20-39 Syntax, Semantics, and Pragmatics; Mathe-
matical and Computational Linguistics
40-49 Language Acquisition and Psycholin-
guistics
50-59 Sociolinguistics
60-69 Language Change, Language, and Cul-
ture
70-84 Linguistic Analysis of a Language
83-94 Methods
95-99 Directed Work, Theses, Dissertations

1. Introduction to Linguistics—The nature of hu-
man language and the methods of modern linguis-
tics. Topics: principles of the structure of human
language, how children acquire language, language
change, universals, regional and social dialects, and
the application of linguistic science to social, educa-
tional, and engineering problems. Additional 1-unit
sections devoted to particular languages may be
offered. See instructor for details. GER:3a (DR:7)
4 units, Aut (Escure)

4. Language and Culture—(Enroll in Anthropol-
ogy 4.)
4-5 units, Win (Inoue)

35Q. Stanford Introductory Seminar: Comput-
ers and Human Language—Preference to sopho-
more. Topics: will computers use natural language
to understand, communicate, or translate? Why is
language processing difficult? How like a human
must one be to understand human language? Con-
clusions of importance for machine translation,
talking robots, and other technologies. The value of
modern linguistic science for such technologies,
and its limitations.
4 units, Aut (Hubbard, Kay)

49Q. Stanford Introductory Seminar: Everyday
Life in Africa—(Same as History 49Q) Preference
to sophomores. From U.S. media and our schools,
Africa is seen as a place of poverty, disease, and
ethnic conflicts. What is it like to live in Africa in
1997? Topics: family life, education, sports, mon-
ey, art, entertainment, health.
4 units, Spr (Jackson, Leben)

51N. Stanford Introductory Seminar: Diverse
Languages, Diverse Speakers—Preference to
freshmen. Overview of selected world languages
for a comparative perspective on human language.
How languages differ from each other, and what
kinds of factual, cultural, and social information all
languages are required to carry. Variety within languages shows what kinds of distinctions are marked. Students’ perspectives on what language is, what linguistics is, and how issues in linguistics connect to social and cultural issues. GER:3a (DR:7)

3 units, Spr (Sells)

52N. Stanford Introductory Seminar: Language and Medicine—Preference to freshmen. Focuses on two central aspects of language, communication and cognition, as they pertain to health care. Emphasis is on discourse practices in doctor-patient communication, public attitudes towards health care, evidence for localization of language skills in the brain, linguistic symptoms of aphasia, Alzheimer’s, schizophrenia, and other mental disorders. GER:3b (DR:9)

3 units, Win (Traugott)

54Q. Stanford Introductory Seminar: Language, Mind, and Computation—Preference to sophomores. The nature of the mind’s language capabilities; the relationship between biochemical principles by which the brain functions and the ability to learn. The role of language in mental activity; the question of whether computers may develop “minds.” Dennett’s Consciousness Explained; Hofstader’s Gödel, Escher, Bach; Penrose’s The Emperor’s New Mind.

3 units, Spr (Peters)


3 units, Aut (Uyechi)

62. History of the English Language—(Same as English 102.) The evolution of English in Britain and the U.S.; colonial and post-colonial English; the use of English world-wide. Emphasis is on issues in language contact, standardization, and the development of English as a literary medium. GER:3a (DR:7)

5 units, Aut (Traugott)

70. The Structure of English Words—Analysis of vocabulary to determine word meanings. Goals: to increase vocabulary, and by enumerating the principles behind changes in pronunciation and meaning, take the mystery out of the processes that have made our vocabulary what it is today. GER:3a (DR:7)

4 units, Aut (Leben)


4 units, Win (Baugh)

75. Introduction to Germanic Languages—(Enroll in German 38A/138.)

3 units, Spr (Robinson)

85. Introduction to Teaching English as a Second Language—Practical approach to teaching English to non-native speakers, focusing on a survey of the features of English which present particular difficulties. Preparation of lessons, practice answering questions, and tutoring of an individual learning to speak English.

4 units, Spr (McChesney)

86. Practicum in Teaching English as a Second Language—Observation and participation in an English as a second language class on a regular basis. Weekly workshop in course planning. Prerequisite: prior or concurrent enrollment in 85.

2 units, Spr (McChesney)

97. Spring Seminar—Introduction to research goals and methods in linguistics and related disciplines. Provides a forum for students to work on a small project that helps define a focus for their linguistic studies. Presentations, discussion, and final paper.

2 units, Spr (Staff)

98. Honors Research

1 or more units, Spr (Staff)

99. Independent Study

1 or more units, any quarter (Staff)

101. The Structure of American Sign Language (ASL)—See 201.

4 units, Win (Staff)

104. History of the German Language—(Enroll in German 203.)

3-5 units, Win (Robinson)

105/205. Phonetics—Introduction to the technical side of phonetics and phonology, including acoustics of speech production, anatomy of the vocal tract, acoustic correlates of speech sounds, aspects of speech perception, spectrogram reading, research techniques, the phonetics/phonology interface. Lab exercises. Prerequisite: 110 or consent of instructor.

4 units, Win (Flemming)

110. Introduction to Phonetics and Phonology—Introduction to the study of sounds as part of language. Phonetics or the physical aspects of speech sound production and perception: anatomy, articulation, acoustics, auditory mechanisms. Phonetic transcription. Phonology, or the mental, abstract aspects of sound used in language: the systems of distinctions among sounds and their combinations. Surveys major research findings and develops abil-
ity to construct and evaluate phonetic experiments and phonological analyses.
4 units, Spr (Flemming)

120. Introduction to Syntax—Analyzes of various grammatical constructions, primarily English, and their consequences for a general theory of language. Practical experience in forming and testing linguistic hypotheses, reading, and constructing rules. GER:3a (DR:7)
4 units, Aut (Sag, Wasow)

121. Intermediate Syntax—How different languages convey meaning through their syntactic structures and their morphology. The concepts and vocabulary for studying these structures and looking for commonalities across different languages. Case studies of languages focus on structures which are counterintuitive to speakers of English but, on closer examination, have parallels to structures in English.
4 units, Win (Zwick)

124A. Introduction to Formal Universal Grammar—See 224A.
4 units, Spr (Bresnan)

130. Introduction to Semantics and Pragmatics—Linguistic meaning and its role in communication. Broad view of issues and problems that face linguistic, psychological, and philosophical efforts to analyze meaning in natural language. Topics: speech acts that can be performed with language; distinction between literal meaning of an utterance and what is communicated; the notion of propositional content; meaning of words, sentences, and discourses; study of presupposition, entailment, and conversational implicature; how to describe the meaning associated with the infinite number of sentences belonging to a language. Prerequisite: 120 or consent of instructor. GER:3a (DR:7)
4 units, Win (Beaver)

131. Uncovering Hidden Meanings: the Pragmatics of Discourse—Introduction to the study of language use in context. Focuses on conversational implicature and inference, pragmatic functions of syntactic construction discourse markers, and the role of non-propositional meaning in communication. Introduction to and discussion of different theoretical approaches to pragmatics and the feasibility of applying them to data from naturally occurring discourse contexts.
4 units, Spr (Staff)

135. Basic Concepts in Mathematical Logic—(Enroll in Philosophy 159.)
4 units, Aut (Faderman)

136. First-Order Logic—(Enroll in Philosophy 160A.)
4 units, Win (Velman)

137. Computational Linguistics Practicum—See 237.
137A. 2 units, Win (Sag, Flickinger)
137B. 2 units, Spr (Flickinger)

138/238. Introduction to Computational Linguistics—See 238.
4 units, Aut (Kay)

140. Language Acquisition I—See 240.
4 units, Win (E. Clark) not given 1997-98

145. Language and Thought—(Enroll in Psychology 131.)
4 units, Aut (Arnold)

146. Language and Gender—Synthesis of literature on the relations between gender and speech style, distinguishing linguistic, sociolinguistic, and feminist issues. Topics: language, socialization, oral and written language, language and class membership. GER:3b,4c (DR:9f)
4 units, Spr (Eckert)

150. Language in Society—The study of language in society. Social dialects, class, ethnic, and gender differences in speech. Prestige and stigma associated with different ways of speaking. Stylistic variation; how speakers adapt their language to different audiences and different social contexts. For additional units, students have the option of a public service internship in an organization dealing with linguistic minorities or language-related issues (bilingual education or language rights) with additional section meeting weekly focusing on their field experience. GER:3b (DR:9) (WIM)
4-6 units, Aut (Schilling-Estes)

155. Introduction to Bilingualism—Causes and consequences of bilingualism from cognitive, socio-cultural, and linguistic perspectives. What does bilingualism tell us about the brain? How are language acquisition processes affected by exposure to more than one language? What are the attitudes towards bilingualism from within and outside of bilingual communities? How does linguistic theory account for bilingualism? GER:3b (DR:9)
4 units, Win (Mahootian)

4 units, Spr (Uyechi)

160. Introduction to Language Change—Variation and change as the natural state of language. Differentiation of dialects and languages over time. Determination and classification of historical relationships among languages, and reconstruction of ancestral stages. Types and explanations of change. Parallels with genetic and cultural evolutionary theory, and implications for the description and explanation of language in general. Language as a window on prehistory: contact, migrations, and the vocabulary of ancient institutions.
4 units, Win (Kiparsky)
4 units, Aut (Escure)

171. Stanford Introductory Seminar: Language and Gender in Japan—Myths and Reality—
(Enroll in Asian Languages 71.)
4 units, Win (Matsumoto)

177. *The Structure of Japanese*—(Enroll in Asian Languages/Japanese 177.)
4 units, Spr (Matsumoto)

188. Teaching Asian Languages—Enroll in Asian Languages 208.)
2 units, Win (Matsumoto)

189/289. *Linguistics and the Teaching of English as a Second/Foreign Language*—Foundation in methods and techniques for teaching second or foreign languages from the perspective of modern linguistics and language acquisition theory. Focus is on teaching English, but principles underlying methods and techniques discussed are applicable to teaching any language.
4-5 units, Win (Hubbard)

200. *Foundations of Linguistic Theory*—Theories that have shaped 20th-century linguistics; recurrent themes and descriptive practice.
4 units, not given 1997-98

201. *The Structure of American Sign Language* (ASL)—An introduction to Sign Language linguistics, including a practicum in which students learn basic signs (ASL) to serve as the basis for lecture, discussion, and investigation of the structure of a visual language. Focus is on the phonology, morphology, and syntax of ASL. Examination of the impact of sign language linguistics on questions facing areas such as neurolinguistics, language acquisition, and sociolinguistics. Recommended: 1 or consent of instructor.
4 units, Win (Staff)

4 units, Aut (Flemming)

207B. *Morphosyntax*—Role of morphology in grammar: how word structure serves syntax in the expression of meaning. Universal properties and typology of morphological categories; proposals towards their principled explanation in a restrictive theory of language.
4 units, Spr (Kiparsky)

208B. *Topics in OT Phonology*—An attempt to define the issues that best distinguish Optimality Theory empirically from other approaches to phonology, and an open-ended, open-minded search for relevant language facts that count for or against a new approach. Covers a broad range of phonological phenomena, including syllable structure, reduplication, harmony systems, and tone.
4 units, Win (Leben)

208C. *Advanced Phonology*—Selected topics in current phonological theory.
4 units, Spr (Flemming)

220A. *Introduction to Syntactic Theory*—Overview of current syntactic issues and theory, with emphasis on work based on Government-Binding theory and the Minimalist Program.
4 units, Aut (Sells)

220B. *Cross-Linguistic Syntax*—Types of critical phenomena found in diverse syntactic systems and their implications for syntactic theory. Emphasis is on cross-linguistic diversity, typological systems, and their relation to general theoretical issues.
4 units, Win (Sells)

4 units, Aut (Sag)

221B. *Topics in HPSG*—Current research on grammatical theory within HPSG and closely related frameworks.
5 units, Spr (Sag)

224A. *Introduction to Formal Universal Grammar*—A formal model of universal grammar explaining radical crosslinguistic variation in syntactic structure. Nonconfigurality in Australian aboriginal languages, through incorporation in native American languages and the Bantu languages of Africa, to scrambling and head movement in more familiar European languages. General issues such as universal grammar design, lexical integrity, and modeling variation and analytic problems from a variety of natural languages. Prerequisites: 120 and some familiarity with logic or other symbolic systems, or consent of instructor.
5 units, Spr (Bresnan)

228A. *Syntax Seminar: A Comparison of Frameworks for Constraint-Based Grammar*—The nature of similarities and differences between HPSG and LFG, two constraint-based frameworks for grammatical description that agree on a number of fundamental descriptions, yet differ in many ways. Underlying architectural assumptions, and the analysis of key syntactic phenomena.
4 units, Win (Dalrymple, Kaplan, Sag)
238. **Introduction to Computational Linguistics**—Introduction to the computational aspects of basic linguistic processes in morphology, syntax, and semantics, and their integration in applications such as machine translation and man-machine interfaces. Grades are based on computer programs implementing key algorithms for parsing, generation, etc., done as homework exercises. Prerequisite: introductory course in Prolog programming.

* 4 units, Win (Kay)

239A. **Topics in Computational Linguistics**

* 4 units, Win (Kay)

239B. **Topics in Computational Linguistics: Foundations of Statistical Natural Language Processing**—Provides a foundation for understanding statistical natural language processing. Elementary probability, information theory and linguistics, statistical models used in NLP and their application to problems such as tagging, parsing, and word sense disambiguation.

* 4 units, Spr (Schütze)

240. **Language Acquisition I**—Survey of the present knowledge of processes of language acquisition from a linguistic point of view. Recent and past literature.

* 4 units (E. Clark) not given 1997-98

241. **Language Acquisition II**—Advanced topics in language acquisition.

* 4 units (E. Clark) not given 1997-98

246. **Psycholinguistics**—(Enroll in Psychology 214.)

* 1-3 units (H. Clark) not given 1997-98

251. **Pidgin and Creole Sociolinguistics**—Key issues in sociolinguistics and pidgin-creole studies, especially ones whose understanding in one field has been assisted by methods or advances in the other, including diglossia, the acts of identity model, the notion of speech community, variable rules, implicational scaling, and the scope of sociolinguistic competence.

* 4 units, Spr (Rickford)

256. **Analysis of Social Interaction on Videotape**—(Same as Education 321B.) Practicum on discourse, interactional, and cultural analysis of videotaped data. Studies transcription of speech and movement of social interactions, and how to identify the patterns which participants use to display and interpret cultural meanings. Theoretical assumptions hidden in transcription systems. Levels of analysis of videotaped interactional data, and the basis on which analytic claims can be founded.

* 4 units, Aut (Linde, McDermott)

257. **Language and Identity: Asian American Voices**—Language issues that face the Asian American community: accent discrimination, second language learning, and negative images of "Asian English." Consideration of the existence of an Asian
American vernacular, and cross-over effects from African American Vernacular English (AAVE). Topics: language attitude, bilingualism, language shift and maintenance, style, accommodation.
4 units, Spr (Uyechi)

258. Sociolinguistic Variation—Advanced introduction to the study of linguistic variability in time, space, and society. Theoretical issues are related to social and linguistic constraints in variation, and issues and methods in the quantitative analysis of variation.
4 units, Win (Eckert)

259. Models of Code Switching: Review and Comparison—Critical investigation of models of code switching, emphasizing the last 20 years of research and structural accounts of code switching.
4 units, Win (Mahootian)

260A. Historical Phonology and Morphology
4 units, Win (Kiparsky)

262. English Transplanted, English Transformed—(Same as 162.) Transformations in the English language which took place as it was transplanted from Britain to the Third World and other parts of the British Empire from the 16th century on, concentrating on the language mixture, simplification, and complication processes which resulted in new “pidgins” and “creoles.” Characteristics of these languages and their social, political, and literary/expressive contexts, focusing on varieties (e.g., Cameroon, China, the Caribbean, India, Malaysia, Papua New Guinea). Possible field trip to a pidgin or creole-speaking region (e.g., Hawaii or the S. Carolina Sea Islands).
4 units, Aut (Escure)

286. Sociolinguistic Field Methods—Overview of and practice in the principle methods of data collection in sociolinguistics, along with an assessment of their strengths and weaknesses.
4 units, Spr (Schilling-Estes)

289. Linguistics and the Teaching of English as a Second/Foreign Language—See 189.
4-5 units, any quarter (Staff)

295A, B, C: Topics in Sociolinguistics

297. Directed Reading
1-5 units, any quarter (Staff)

298. Directed Research—Research at predissertation level.
1-6 units, any quarter (Staff)

399. Dissertation Research
1-15 units, any quarter (Staff)

REGULARLY OFFERED BUT NOT DURING 1997-98

5. The Biology and Evolution of Language
140/240. Language Acquisition I
159. Language and Youth Culture
200. Foundations of Linguistic Theory
207A. Morphology
241. Language Acquisition II
250. Sociolinguistic Theory and Analysis
255A, B, C: Topics in Sociolinguistics

282. Topics in Pragmatics
287. Phonetics Field Methods
288. Structure of Hausa

ENGLISH AS A SECOND LANGUAGE
(683-699)

These courses represent the offerings for non-native speakers in Autumn, Winter, and Spring Quarters. Enrollment in one or more courses may be required of, or recommended to, current graduate students from other countries after they have taken the English screening examination. To enroll, students must come to the English for Foreign Students office the first day of each quarter.

During the Summer Session, courses in spoken and written English are offered. Two six-week intensive courses are also offered during the summer. Summer visitors must apply directly to the EFS program.

690A. Interacting in English—Strategies for effective interaction in academic settings. Emphasis is on functional language used in typical university settings, including active listening, asking questions, and contributing ideas and opinions. Activities include simulation and discussion, with feedback on pronunciation, grammar, and usage.
3 units, Aut (Rylance, Staff)

690B. Academic Discussion—Refinement and practice of discussion skills. Preparation for effective participation in classroom and research group communication. Detailed feedback on pronunciation, grammar, and usage. Prerequisite: 690A or consent of instructor
3 units, Aut, Win, Spr (Rylance, Mawson)

691. Oral Presentation—For advanced graduate students. Practice in academic presentation skills; strategy, design, organization, and use of visual aids. Focus is on improving fluency and delivery style, with videotaping for extensive feedback on language accuracy and usage. Prerequisite: 695 or consent of instructor.
3 units, Win, Spr (Rylance, Mawson, Staff)
692. Speaking and Teaching in English—For non-native speakers who must teach in English. Focus is on developing clarity, intelligibility, and effectiveness through weekly presentations simulating actual teaching assistant responsibilities.

1-3 units, Aut, Spr (McChesney, Hubbard, Rylance)

693A. Listening Comprehension—Strategies for effective listening in an academic setting, focusing on identifying key ideas in lectures. Practice in understanding words and phrases commonly encountered in classroom settings. Work with computer-based exercises promotes comprehension of rapid, natural speech.

3 units, Aut (Hubbard, Staff)

693B. Advanced Listening Comprehension—Intensive practice in understanding academic English, the news media, and popular culture. Emphasis is on effective strategies, with independent work on computer-based materials and individual projects. Prerequisite: 693A or consent of instructor.

3 units, Aut, Win (Hubbard, Rylance)

694. Interpreting English—For advanced graduate students. Analysis and practice of communicative intent in interpersonal interaction and in the mass media. Use of language to inform, persuade, and critique. Prerequisite: 693A or consent of instructor.

3 units, Win, Spr (McChesney, Staff)


3 units, Aut, Win, Spr (Mawson, Staff)

695B. Advanced Pronunciation and Intonation—Continuation of 695A, with emphasis on self-monitoring. Limited enrollment. Prerequisite: 695A.

2 units, Win (Mawson)

698A. Writing Academic English—Prepares graduate students to write academic papers; emphasis on fluency, organization, documentation, and appropriateness for specific writing tasks.

3 units, Aut, Win, Spr (McChesney, Rylance)

698B. Advanced Graduate Writing—For graduate students experienced in English writing and currently required to write for courses and research. Class meetings and frequent individual conferences. Prerequisite: consent of instructor.

3 units, Aut, Win, Spr (Hubbard, Staff)

LITERATURE IN TRANSLATION

At Stanford, courses in literature are taught in a number of departments and programs that work with texts in many languages. However, departments and programs do offer specific courses which use texts translated into English in order to make these works available to students who do not read the original language. The following list of courses has been prepared to assist students in selecting courses which feature foreign works in English translation for the academic year 1997-98. Consult the department listings for further information.

ASIAN LANGUAGES

GENERAL

71N. Stanford Introductory Seminar: Language and Gender in Japan—Myths and Reality

91. Traditional East Asian Civilizations: China

92. Traditional East Asian Civilization: Japan

131. Chinese Poetry in Translation

132. Chinese Fiction and Drama in Translation

133. Modern and Contemporary Chinese Literature in Translation

137. Japanese Fiction in Translation

138. Modern Japanese Literature in Translation

187. Romance, Desire, and Sexuality in Modern Japanese Literature

CLASSICS

GENERAL

12. Greek Tragedy

18. Greek Mythology

19N. Stanford Introductory Seminar: Gospel of John—Its Early History as a Controversial Text

104. Early Christianity

117. Gender, Violence, and the Body in Ancient Religion

139. Medicine in Ancient Greece and Rome

169. Introduction to the Ethics of Socrates, Plato, and Aristotle

FRENCH AND ITALIAN

GENERAL

166E. Women's Voices in Contemporary Italian Literature

191E. Women in Italian Cinema

192E. Images of Women in French Cinema: 1930-1990

201E. Definition and Inquiry: Colloquium on Research Methods in French and Italian

208E. Female Saints

224E. Psychoanalytic Theory of Feminity
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<tr>
<th><strong>LITERATURE IN TRANSLATION</strong></th>
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<tr>
<td>252E. Languages, Structures, and Societies: An Introduction to Structuralism</td>
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<td>254E. Introduction to French Philosophy: From 1943 to the Present</td>
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<td>259E. Paradigms of Modern Thought: Michel Foucault and the Archaeology of Knowledge</td>
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<td>267E. 20th-Century Italian Poetry and the Experience of the War(s)</td>
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<td>357E. Of Madness: A Phenomenological Approach</td>
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<th><strong>GERMAN STUDIES</strong></th>
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<td><strong>GENERAL</strong></td>
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<tr>
<td>8A, 9A. Myth and Modernity</td>
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<td>8A. Reason and Revolution</td>
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<td>9A. Rationalization and the Return of Myth</td>
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<td>38A. Introduction to the Germanic Languages</td>
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<td>78Q. Stanford Introductory Seminar: The Germans—Who are They?</td>
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<td>120N. Stanford Introductory Seminar: Nationality and the Discourse of Reason</td>
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<td>162A. The Faust Legend in Literature and Film</td>
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<td>168A. Hesse, Kafka, Mann</td>
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<td>175A. Modernization, Technology, and Culture in Germany, 1900-1945</td>
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<td>241A, 242A, 243A.</td>
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<tr>
<td>241A. Deutsche Geistesgeschichte I: 18th-Century German Thought</td>
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<td>242A. Deutsche Geistesgeschichte II: 19th-Century German Thought</td>
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<td>243A. Deutsche Geistesgeschichte III: 20th-Century German Thought</td>
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<td>245A. Classicisms: Images of Antiquity in 18th- and 19th-Century Germany</td>
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<th><strong>HUMANITIES</strong></th>
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<td><strong>SPECIAL PROGRAMS</strong></td>
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<tr>
<td>311, 312, 313, 314, 315. Graduate Program in Humanities Seminars—Open to graduate students only, consent of the instructor.</td>
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<tr>
<td>311. Classical Seminar</td>
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<td>312. Medieval Seminar</td>
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<td>313. Renaissance/Early Modern Seminar</td>
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<td>314. Modern Seminar</td>
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<td>315. Graduate Core Colloquium: The Interdisciplinary Study of the Humanities</td>
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<th><strong>LANGUAGE CENTER</strong></th>
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<td><strong>SPECIAL LANGUAGE PROGRAM</strong></td>
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<tr>
<td>125A, C, D. Topics in Arabic Literature and Culture</td>
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<td>125A. The Contemporary Arab World and Culture through Literature</td>
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<td>125C. Contemporary Arab Women Writers and Issues</td>
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<td><strong>125D. Arab World through Travel Literature</strong></td>
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<tr>
<td><strong>172Q. Stanford Introductory Seminar: Literature and Culture of Modern Greece</strong></td>
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| **SLAVIC LANGUAGES AND LITERATURES** |
| **GENERAL** |
| 12N. Stanford Introductory Seminar: Studies in Russian—*Prince Igor* and *Boris Godunov* |
| 13N. Stanford Introductory Seminar: Russia, Russian, Russians |
| 45/145/245. *The Age of Experiment (1820-1864)* |
| 46/146/246. *Violence and the Sacred in the Russian Novel: War and Peace, The Brothers Karamazov* |
| 47A/147A/247A. Russian Literature and Culture in the 20th Century |
| 47B/147B/247B. Soviet Cinema |
| 65Q. Stanford Introductory Seminar: Art and Revolution in Russia |
| 66Q. Stanford Introductory Seminar: Madness and Byzantine Civilization |
| 148/248. Totalitarian Cinema |
| 151. Dostoevsky |
| 157. Being and Time in the Novels of Milan Kundera |
| 161/261. Poetess: The Grammar of the Self when the Poet is a Woman |

| **SPANISH AND PORTUGUESE** |
| **GENERAL** |
| 110N. Stanford Introductory Seminar: Arts and Archives—Introduction to Research in Chicana/o Cultural Studies |
| 133E. Portuguese Cultural Perspectives |
| 154E. *Don Quijote* |
| 168E. Chilean Studies |
| 169E. Cultural Dimensions of Globalization |
| 170E. Fiction and Political Imagination |
| 171E. *Eça de Queirós, Liberalism and Portuguese Realism* |
| 172E. Portuguese Literature: The Drama of Gil Vicente |
| 173E. Portuguese Poetry in Translation: Middle Ages to Renaissance |
The Division of Literatures, Cultures, and Languages embraces six academic departments: Asian Languages and Literatures, Comparative Literature, French and Italian, German Studies, Slavic Languages and Literatures, Spanish and Portuguese, and the Language Center, which is charged with facilitating and overseeing all language instruction at Stanford. All the member departments of the division offer full-fledged academic programs leading to bachelor’s, master’s, and doctoral degrees. The division brings together scholars and instructors dedicated to the study of foreign literatures, cultures, and languages from humanistic and interdisciplinary perspectives. The departments in the division are distinguished by the quality, size, and diversity of their faculty, a wide variety of approaches to cultural tradition and expression, and the intense focus on the mastery of foreign languages. This wealth of academic resources, together with small classes and the emphasis on individual advising, creates a superior opportunity for students who wish to be introduced to or develop a deeper understanding of non-English speaking cultures.

The Division of Literatures, Cultures, and Languages

Chair of the Executive Committee: Russell Berman (German Studies)
Executive Committee: Russell Berman (German Studies), Elizabeth Bernhardt (Language Center), Ralph Hester (French and Italian), Seth Lerer (Comparative Literature), Mary L. Pratt (Spanish and Portuguese), Haun Saussy (Asian Languages), Richard Schupbach (Slavic Languages and Literatures)
At-Large Members: Elizeth Boyi (French and Italian), Guadalupe Valdés (Spanish and Portuguese)

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**SLAVIC LITERATURES AND LANGUAGES**

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Units</th>
<th>Semester</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>12N</td>
<td>Stanford Introductory Seminar: Studies in Russian—Prince Igor and Boris Godunov</td>
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<td>Fleishman</td>
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<tr>
<td>13N</td>
<td>Stanford Introductory Seminar: Russia, Russian, Russians</td>
<td>3</td>
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<td>Schupbach, Freidin</td>
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**SPANISH AND PORTUGUESE**

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<tr>
<td>110N</td>
<td>Stanford Introductory Seminar: Arts and Archives—Research in the Stanford Chicano Collections</td>
<td>3</td>
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**PREFERENCE TO SOPHOMORES**

**ASIAN LANGUAGES**

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<tr>
<td>75Q</td>
<td>Stanford Introductory Dialogue: The Chinese Cultural Revolution and its Aftermath</td>
<td>1</td>
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<td>Y. Wang</td>
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**COMPARATIVE LITERATURE**

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<tr>
<td>115Q</td>
<td>Stanford Introductory Dialogue: Thinking in the Present—20th-Century European Philosophy</td>
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<td>204Q</td>
<td>Stanford Introductory Seminar: Ethnicity and Literature</td>
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**FRENCH AND ITALIAN**

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<tr>
<td>189Q</td>
<td>Stanford Introductory Seminar: Romance—Texts and Movies</td>
<td>4</td>
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<tr>
<td>190Q</td>
<td>Stanford Introductory Seminar: Paris in History, Literature, and Film</td>
<td>4</td>
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<td>Bertrand</td>
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**GERMAN STUDIES**

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<tr>
<td>78Q</td>
<td>Stanford Introductory Seminar: The Germans—Who are They?</td>
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<tr>
<td>125Q</td>
<td>Stanford Introductory Seminar: The World of Epic</td>
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<td>Andersson</td>
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**SLAVIC LITERATURES AND LANGUAGES**

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<tbody>
<tr>
<td>65Q</td>
<td>Stanford Introductory Seminar: Art and Revolution in Russia</td>
<td>3</td>
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<tr>
<td>66Q</td>
<td>Stanford Introductory Seminar: Madness and Byzantine Civilization</td>
<td>4</td>
<td>Aut</td>
<td>Arkhipov</td>
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**SPANISH AND PORTUGUESE**

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<tbody>
<tr>
<td>193Q</td>
<td>Stanford Introductory Seminar: Spaces and Voices of Brazil</td>
<td>3-5</td>
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**SPECIAL LANGUAGE PROGRAM**

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<tbody>
<tr>
<td>201Q</td>
<td>Stanford Introductory Seminar: Literature and Culture of Modern Greece</td>
<td>3-5</td>
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**TAUGHT IN ENGLISH**

**ASIAN LANGUAGES**

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<tbody>
<tr>
<td>51/151</td>
<td>Japanese Business</td>
<td>3</td>
<td>Win</td>
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<td>91</td>
<td>Traditional East Asian Civilization: China</td>
<td>5</td>
<td>Aut</td>
<td>Rudolph</td>
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<tr>
<td>92</td>
<td>Traditional East Asian Civilization: Japan</td>
<td>5</td>
<td>Win</td>
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</table>

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<tbody>
<tr>
<td>133E</td>
<td>Literature and Society: Introduction to Francophone Literature from Africa and the Caribbean</td>
<td>4</td>
<td>Win</td>
<td>Mudimbe-Boyi</td>
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<tr>
<td>166E</td>
<td>Women’s Voices in Contemporary Italian Literature</td>
<td>4</td>
<td>Aut</td>
<td>Springer</td>
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<tr>
<td>191E</td>
<td>Women in Italian Cinema</td>
<td>4-5</td>
<td>Spr</td>
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<tr>
<td>208E</td>
<td>Female Saints</td>
<td>4</td>
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<td>214E</td>
<td>Images of the Afterlife</td>
<td>4-5</td>
<td>Spr</td>
<td>Harrison</td>
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<tr>
<td>221E</td>
<td>Language, Meaning, and the Making of Poetry</td>
<td>4-5</td>
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<tr>
<td>223E</td>
<td>Literature and Psychoanalysis</td>
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<tr>
<td>224E</td>
<td>Psychoanalytic Theory of Femininity</td>
<td>3-5</td>
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<tr>
<td>247E</td>
<td>Fictions of the Self: First Person Narration in Modern Europe</td>
<td>3-5</td>
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<tr>
<td>252E</td>
<td>Languages, Structures, and Societies: An Introduction to Structuralism</td>
<td>3-5</td>
<td>Win</td>
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<tr>
<td>254E</td>
<td>Introduction to French Philosophy: From 1943 to the Present</td>
<td>3-5</td>
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<tr>
<td>259E</td>
<td>Paradigms of Modern Thought: Michel Foucault and the Archeology of Knowledge</td>
<td>3-5</td>
<td>Win</td>
<td>Mudimbe</td>
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<tr>
<td>263E</td>
<td>Love Books of the Middle Ages</td>
<td>4-5</td>
<td>Win</td>
<td>Harrison</td>
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<tr>
<td>267E</td>
<td>20th-Century Italian Poetry and the Experience of the War(s)</td>
<td>4-5</td>
<td>Spr</td>
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<tr>
<td>278E</td>
<td>Topics in French and Francophone Literature: Discourse on Self-Representation</td>
<td>3-5</td>
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<td>Mudimbe-Boyi</td>
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<tr>
<td>282E</td>
<td>Revisiting May 1968: Concepts of a “Revolution” that comes from the Universities</td>
<td>3-5</td>
<td>Win</td>
<td>Gumbrecht, Apostolidès</td>
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<tr>
<td>284E</td>
<td>Francophone Women Writers: A Cross Cultural Perspective</td>
<td>3-5</td>
<td>Win</td>
<td>Mudimbe-Boyi</td>
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<tr>
<td>312E</td>
<td>The “Linea Longobarda”</td>
<td>3-5</td>
<td>Win</td>
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<tr>
<td>357E</td>
<td>Of Madness: A Phenomenological Approach</td>
<td>3-5</td>
<td>Spr</td>
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<tr>
<td>370E</td>
<td>The Anthropology of Speed Culture</td>
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<tbody>
<tr>
<td>45/145/245</td>
<td>The Age of Experiment (1820-1840)</td>
<td>4</td>
<td>Aut</td>
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<tr>
<td>46/146/246</td>
<td>Violence and the Sacred in the Russian Novel: War and Peace, The Brothers Karamazov</td>
<td>3-4</td>
<td>Win</td>
<td>Moeller-Sally</td>
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<tr>
<td>47A/147A/247A</td>
<td>Russian Literature and Culture in the 20th Century</td>
<td>3-4</td>
<td>Spr</td>
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<tr>
<td>47B/147B/247B</td>
<td>Soviet Cinema</td>
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<td>Fleishman</td>
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<tr>
<td>151</td>
<td>Dostoevsky</td>
<td>4</td>
<td>Aut</td>
<td>Frank</td>
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<tr>
<td>157</td>
<td>Being and Time in the Novels of Milan Kundera</td>
<td>5</td>
<td>Aut</td>
<td>Moeller-Sally</td>
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<tr>
<td>161/261</td>
<td>Poetess: The Grammar of the Self when the Poet is a Woman</td>
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<tr>
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<td>154E</td>
<td>Don Quijote</td>
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<td>169E</td>
<td>Cultural Dimensions of Globalization</td>
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<td>Eça de Queirós, Liberalism and Portuguese Realism</td>
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<td>Portuguese Literature: The Drama of Gil Vicente</td>
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<td>Portuguese Poetry in Translation: Middle Ages to Renaissance</td>
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177E. Angola and San Tomé: Literature and Culture
3-5 units, Win (de Carvalho)

255. The New World and the Machine: The Technological Imagination in Latin America
3-5 units, Win (Giucci)

3-5 units, Spr (Wynter)

306E. Introduction to Literary Criticism and Theory: Sociocriticsims
3-5 units, Win (Pratt)

360E. Modern Brazilian Literature and Culture—City and Culture in Brazil
3-5 units, Win (Jaguaribe)

SPECIAL LANGUAGE PROGRAM
125A. The Contemporary Arabic World through Literature and Culture
4 units, Aut (Barhoum)

SPECIAL LANGUAGE PROGRAM
Special Language Program
Senior Lecturer in Arabic: Khalil Barhoum
Lecturer in Hebrew: Anna Berman
Lecturer in Modern Greek and Coordinator: Eva Prionas
Lecturer in Swahili: John Mugane

The Special Language Program offers a number of foreign languages not otherwise taught at Stanford. Based on current funding and student requests, the courses planned for 1997-98 are listed below; however, not every course listed will be taught. Additional languages may still be offered upon request, provided funding is available. Requests for the 1998-99 academic year should be made by Spring Quarter of this year at the Special Language Program office. For further information and to request forms, consult the Special Language Program, Building 40, room 41B.

All beginning-level 3-unit courses are offered on a Satisfactory/No Credit basis only. Intermediate-level and 4-unit courses are offered with a grading option. No auditors. “Beginning” and “Intermediate” each refer to an academic year’s sequence of language study; the suffixes A, B, and C refer to first-, second-, and third-quarter of language instruction that year. Most languages are offered for a two-year, three-quarter sequence; however, a beginning or intermediate level might be offered on alternate years.

AFRICAN LANGUAGES

103A,B,C. Intermediate Hausa
103A. 3 units, Aut (Staff)
103B. 3 units, Win (Staff)
103C. 3 units, Spr (Staff)

106A,B,C. Beginning Swahili—Successful completion of 106C may fulfill the foreign language requirement.
106A. 4 units, Aut (Mugane)
106B. 4 units, Win (Mugane)
106C. 4 units, Spr (Mugane)

107A,B,C. Intermediate Swahili
107A. 3 units, Aut (Mugane)
107B. 3 units, Win (Mugane)
107C. 3 units, Spr (Mugane)

108A,B,C. Advanced Swahili
108A. 3 units, Aut (Mugane)
108B. 3 units, Win (Mugane)
108C. 3 units, Spr (Mugane)

OTHER LANGUAGES

120A,B,C. Beginning Arabic—Successful completion of 120C may fulfill the foreign language requirement.
120A. 4 units, Aut (Barhoum)
120B. 4 units, Win (Barhoum)
120C. 4 units, Spr (Barhoum)

121A,B,C. Intermediate Arabic
121A. 4 units, Aut (Barhoum)
121B. 4 units, Win (Barhoum)
121C. 4 units, Spr (Barhoum)

122A,B,C. Advanced Arabic
122A. 4 units, Aut (Barhoum)
122B. 4 units, Win (Barhoum)
122C. 4 units, Spr (Barhoum)

125A,C,D. Topics in Arabic Literature and Culture—Introduces the literary and cultural facets of the Arab world not usually dealt with at Stanford. May be taken independently. Readings/discussion in English.

125A, The Contemporary Arab World and Culture through Literature—Introduces the Arab world through a survey of different literary genres (i.e., poetry, novels, short stories), providing a glimpse at contemporary Arab society and culture. Readings from prominent male and female authors, dealing with dominant cultural topics (nationalism, religion, gender and women issues, kinship and social concepts, etc.). Texts delineate the cultural uniqueness of the Arab world, including major works by Naguib Mahfouz, Nawal El-Saadawi, Ghassan Kanafani, Tayyeb Salih, Etel Adnan, and representative samples of poetry and short stories spanning the Arab world. GER:3a,4a (DR:2 or 7)
4 units, Aut (Barhoum)

125C. Contemporary Arab Women Writers and Issues—Selections of fiction and non-fiction works by prominent Arab women writers. Discussion and analysis of the main cultural factors contributing to the shaping of their dominant feminist conceptions and attitudes.
Readings: Fatima Mernissi's *Dreams of Trespass*; Nawal El Saadawi's *God Dies by the Nile*; Etel Adnan's *Sitt Marie Rose*; Hala Deeb Jabbour's *A Woman of Nazareth*; Elizabeth Fernea's *Women and the Family in the Middle East*; Alifa Rifaat's *Distant View of a Minaret*. Alternates with 625B, Contemporary Arab Writers.

**125D. The Arab World through Travel Literature**—Early colonialist and post-colonialist portrayals of Arab culture in the West, and recent critical examinations of such stereotypical depictions of Arabs and Islam. Readings: Gustave Flaubert's *Flaubert in Egypt*; Jonathan Raban's *Arabia through the Looking Glass*; Elizabeth Fernea's * Guests of the Sheik*; Lady Mary Wortley Montagu's *Letters*; Lawrence Durrell's *The Alexandria Quartet*; Edward Said's *Covering Islam and the Introduction to Orientalism*; Jack Shaheen's *The T.V. Arab*; Maxine Rodinson's *Europe and the Mystique of Islam*; Geraldine Brooks' *Nine Parts of Desire*; Eric Hansen's *Moptoring with Mohammed*. GER: 3a (DR: 7)

4 units, Win (Barhoum)

**128A,B,C. Beginning Hebrew**—Successful completion of 128C may fulfill the foreign language requirement.

128A. 4 units, Aut (Berman)
128B. 4 units, Win (Berman)
128C. 4 units, Spr (Berman)

129A,B,C. Intermediate Hebrew

129A. 4 units, Aut (Berman)
129B. 4 units, Win (Berman)
129C. 4 units, Spr (Berman)

130A,B,C. Advanced Hebrew

130A. 4 units, Aut (Berman)
130B. 4 units, Win (Berman)
130C. 4 units, Spr (Berman)

150A,B,C. Beginning Vietnamese

150A. 3 units, Aut (Ha)
150B. 3 units, Win (Ha)
150C. 3 units, Spr (Ha)

152A,B,C. Beginning Hindi

152A. 3 units, Aut (Singh)
152B. 3 units, Win (Singh)
152C. 3 units, Spr (Singh)

156A,B,C. Beginning Indonesian

156A. 3 units, Aut (Burke)
156B. 3 units, Win (Burke)
156C. 3 units, Spr (Burke)

159A,B,C. Beginning Punjabi

159A. 3 units, Aut (Dhillon)
159B. 3 units, Win (Dhillon)
159C. 3 units, Spr (Dhillon)

162A,B,C. Beginning Tamil

162A. 3 units, Aut (Rangaraju)
162B. 3 units, Win (Rangaraju)
162C. 3 units, Spr (Rangaraju)

170A,B,C. Beginning Modern Greek—Successful completion of 170C may fulfill the foreign language requirement.

170A. 4 units, Aut (Prionas)
170B. 4 units, Win (Prionas)
170C. 4 units, Spr (Prionas)

171A,B,C. Intermediate Modern Greek

171A. 3 units, Aut (Prionas)
171B. 3 units, Win (Prionas)
171C. 3 units, Spr (Prionas)

172Q. Stanford Introductory Seminar: Literature and Culture of Modern Greece—Preference to sophomores. Focuses on modern Greece since its establishment as a nation. Discussion and analysis of literary works. Films and documents highlight issues related to Greek institutions, social structures, traditions, and culture. Emphasis is on topics of ethnicity, Greek heritage and national identity, kinship and gender issues, and migration patterns.

3-5 units, Aut (Prionas)

174A,B,C. Beginning Quechua

174A. 3 units (Fajardo)
174B. 3 units (Fajardo)
174C. 3 units (Fajardo)

176A,B,C. Beginning Thai

176A. 3 units, Aut (Lertrakskun)
176B. 3 units, Win (Lertrakskun)
176C. 3 units, Spr (Lertrakskun)

178A,B,C. Beginning Sign (ASL)

178A. 3 units, Aut (Haas)
178B. 3 units, Win (Haas)
178C. 3 units, Spr (Haas)

179A,B,C. Intermediate Sign (ASL)

179A. 3 units, Aut (Haas)
179B. 3 units, Win (Haas)
179C. 3 units, Spr (Haas)

**MATHEMATICAL AND COMPUTATIONAL SCIENCE**

Chair: Bradley Efron

Committee in Charge: Takeshi Amemiya (Economics), Gunnar Carlsson, Richard Cottle (Engineering-Economic Systems and Operations Research), Bradley Efron (Statistics), Gene Golub (Computer Science), George Papantonio (Mathematics, and Computer Science), David Siegmund (Statistics), Andrew
This interdepartmental, interschool undergraduate program is designed as a major for students interested in the mathematical and computational sciences, or in the use of mathematical ideas and analysis in problems in the social or management sciences. It provides a core of mathematics basic to all of the mathematical sciences and an introduction to the concepts and techniques of automatic computation, optimal decision-making, probabilistic modeling, and statistical inference. It also provides an opportunity for elective work in any of the mathematical science disciplines at Stanford.

The program utilizes the faculty and courses of the departments of Computer Science, Mathematics, Engineering-Economic Systems and Operations Research, and Statistics. It prepares students for graduate study or employment in the mathematical and computational sciences or in those areas of applied mathematics which center around the use of high-speed computers and are concerned with the problems of the social and management sciences.

**UNDERGRADUATE PROGRAMS**

**BACHELOR OF SCIENCE**

The requirement for the bachelor's degree, beyond the University's basic requirements, is an approved course program of 76 to 80 units, distributed as follows:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mathematics (33-34 units)</strong></td>
<td></td>
</tr>
<tr>
<td>1. Math. 41, 42, 43. Calculus</td>
<td>15</td>
</tr>
<tr>
<td>or Math. 19, 20, 21, 43</td>
<td></td>
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<tr>
<td>Math. 44. Calculus</td>
<td>3</td>
</tr>
<tr>
<td>Math. 103. Matrix Theory and its Applications</td>
<td>3</td>
</tr>
<tr>
<td>or Math 113. Linear Algebra and Matrix Theory</td>
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<tr>
<td>Math. 104. Continuation of 103</td>
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<tr>
<td>or Math. 114. Continuation of 113</td>
<td>3</td>
</tr>
<tr>
<td>Math. 109. Modern Algebra and its Applications</td>
<td></td>
</tr>
<tr>
<td>or Math. 120. Modern Algebra I</td>
<td>3</td>
</tr>
<tr>
<td>Math. 130. Ordinary Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>2. One of the following:</td>
<td></td>
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<tr>
<td>Computer Science 137. Fundamentals of Numerical Computation</td>
<td>4</td>
</tr>
<tr>
<td>Math. 115. Fundamental Concepts of Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Math. 160A. First Order Logic</td>
<td>4</td>
</tr>
<tr>
<td><strong>Computer Science (CS) (16-18 units)</strong></td>
<td></td>
</tr>
<tr>
<td>1. CS 106X. Programming Methodology and Abstractions (Accelerated)</td>
<td>5</td>
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<tr>
<td>(CS 106A and B may be substituted)</td>
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</tr>
<tr>
<td>2. CS 109A,B. Introduction to Computer Science</td>
<td>8</td>
</tr>
<tr>
<td>3. One of the following:</td>
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<tr>
<td>CS 107. Programming Paradigms</td>
<td>5</td>
</tr>
<tr>
<td>CS 137. Fundamentals of Numerical Computation</td>
<td>4</td>
</tr>
<tr>
<td>CS 138A,B. Introduction to Numerical Analysis</td>
<td>4</td>
</tr>
<tr>
<td>CS 154. Introduction to Automata and Complexity Theory</td>
<td>4</td>
</tr>
<tr>
<td>or CS 254. Automata, Languages, and Computability</td>
<td></td>
</tr>
<tr>
<td>CS 260. Concrete Mathematics</td>
<td>3</td>
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<tr>
<td><strong>Engineering-Economic Systems and Operations Research (EES&amp;OR) (8-9 units)</strong></td>
<td></td>
</tr>
<tr>
<td>EES&amp;OR 111. Introduction to Operations Research I (Enroll in Engineering 62)</td>
<td>4</td>
</tr>
<tr>
<td>EES&amp;OR 121. Introduction to Operations Research II</td>
<td>4</td>
</tr>
<tr>
<td>or EES&amp;OR 211. Linear and Non-Linear Optimization</td>
<td>3</td>
</tr>
<tr>
<td>(or EES&amp;OR 212. Integer and Programming Network Flows)</td>
<td>4</td>
</tr>
<tr>
<td><strong>Statistics (10 units)</strong></td>
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<tr>
<td>Stat. 200. Introduction to Statistical Inference</td>
<td>3</td>
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<tr>
<td>Stat. 201. Statistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>or Stat. 203. Introduction to Regression Models and Analysis of Variance</td>
<td>3</td>
</tr>
<tr>
<td><strong>Electives (9 units)</strong></td>
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<tr>
<td>Three courses in mathematical and computational science, 100-level or above, and at least 3 units each.</td>
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<tr>
<td>At least one must be chosen from the following list:</td>
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<tr>
<td>Comp. Sci. 108. Object-Oriented Systems Design</td>
<td>4</td>
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<tr>
<td>Econ. 160. Game Theory and Economic Applications</td>
<td>5</td>
</tr>
<tr>
<td>Econ. 170-172. Intermediate Econometrics I-III</td>
<td>5</td>
</tr>
<tr>
<td>Econ. 180. Mathematics for Economists</td>
<td>5</td>
</tr>
<tr>
<td>Econ. 181. Optimization and Economic Analysis</td>
<td>5</td>
</tr>
<tr>
<td>EES&amp;OR 273. Stochastic Models in Operations Research</td>
<td>3</td>
</tr>
<tr>
<td>Math. 106. Introduction to Theory of Functions of a Complex Variable</td>
<td>3</td>
</tr>
<tr>
<td>Math. 131. Partial Differential Equations I</td>
<td>3</td>
</tr>
<tr>
<td>Stat. 217. Introduction to Stochastic Processes</td>
<td>3</td>
</tr>
<tr>
<td>Elect. Engr. 261. The Fourier Transform and its Applications</td>
<td>3</td>
</tr>
<tr>
<td>For Computer Science (CS), suggested electives include those courses not taken under item 3 of the above Computer Science list and the following:</td>
<td></td>
</tr>
<tr>
<td>CS 108. Object Oriented Systems Design</td>
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<tr>
<td>CS 110. Introduction to Computer Systems and Assembly Language Programming</td>
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</tr>
<tr>
<td>CS 112. Computer Organization and Design (Enroll in Elect. Engr. 182)</td>
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<tr>
<td>CS 143. Compilers</td>
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<tr>
<td>CS 157. Logic and Automated Reasoning</td>
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<tr>
<td>CS 161. Data Structures and Algorithms</td>
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<tr>
<td>CS 194. Software Project</td>
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<tr>
<td>CS 211. Logic Design (Enroll in Elect. Engr. 381)</td>
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<tr>
<td>CS 221. Introduction to Artificial Intelligence</td>
<td></td>
</tr>
<tr>
<td>CS 237A. Numerical Linear Algebra</td>
<td></td>
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<tr>
<td>CS 240A. Operating Systems and Systems Programming</td>
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</tbody>
</table>
With the adviser's approval, courses other than those offered by the sponsoring departments may be used to fulfill part of the elective requirement. There are courses in economics, electrical engineering, industrial engineering, and so on, that might be relevant to a mathematical sciences major, depending on the particular interest of the student. Majors must file with their advisers a plan for completing degree requirements at least three quarters before graduation. All courses used to fulfill major requirements must be taken for a letter grade with the exception of courses offered Satisfactory/No Credit only. A course used to fulfill the requirements of one section of the program may not be applied toward the fulfillment of the requirements of another section. The student must have a grade point average (GPA) of 'C' or better in all course work used to fulfill the major requirement.

MINORS

The minor in mathematical and computational science is intended to provide an upper-division experience of four constituent areas: computer science, mathematics, operations research, and statistics. The minor requires a minimum of six upper-division courses, at least one from each of the four area. Eligible courses include:

Comp. Sci. 107. Programming Paradigms
Comp. Sci. 137. Fundamentals of Numerical Computation
Comp. Sci. 138A. Numerical Analysis
Comp. Sci. 154. Introduction to Automata and Computability
Comp. Sci. 254. Automata, Languages, and Computability
Comp. Sci. 260. Concrete Mathematics
Econ. 160. Game Theory and Economic Applications
Econ. 170-72. Intermediate Econometrics I-II
Econ. 180. Mathematics for Economics
Econ. 181. Optimization and Economic Analysis
Elect. Engr. 261. The Fourier Transform and its Applications
Engr.-Econ. Syst. & Op. Res. 211. Linear and Nonlinear Optimization
Math. 104. Matrix Theory and its Applications
Math. 106. Introduction to Theory of Functions of a Complex Variable
Math. 109. Modern Algebra and its Applications
Math. 115. Fundamental Concepts of Analysis, or Math. 171
Math. 131. Partial Differential Equations I
Math. 160A. First Order Logic
Stat. 200. Introduction to Statistical Inference
Stat. 201. Statistical Methods
Stat. 203. Analysis of Variance
Stat. 217. Introduction to Stochastic Processes

Other upper-division courses appropriate to the program major may be substituted with the permission of the program director. Undergraduate majors in the constituent programs cannot count courses in their own departments.

HONORS PROGRAM

The honors program is designed to encourage a more intensive study of mathematical sciences than the Bachelor of Science program. In addition to meeting all requirements for the B.S. in Mathematical and Computational Science, the student must:

1. Maintain, in mathematical sciences courses, a GPA of at least 3.4.
2. Complete at least 15 units in mathematical sciences in addition to the requirements for the major listed above. These courses should form a sustained effort in one area and constitute a program approved by the committee in charge of the Mathematical and Computational Science Program.
3. Include in the above 15 units at least one of: (a) an approved higher-level graduate course, (b) participation in a small group seminar, or at least 3 units of directed reading.

Prospective honors students should consult with their advisers by the last quarter of the junior year to prepare a program of study for approval by the committee in charge.

MATHEMATICS

Chair: Gunnar Carlsson
Associate Professors: Amir Dembo, Jun Li
Assistant Professors: Benjamin Andrews, E. Jerome Borenstein, Paul Biran, Jeffrey Brock, Jared Bronski, Boris Goldfarb, Kefeng Liu, Matthias Schwarz, Gigliola Staffilani, Constantin Teleman, Hong-Kai Zhao
Courtesy Professor: Renata Kallosh

The Department of Mathematics offers programs leading to the degrees of Bachelor of Science, Master of Science, and Doctor of Philosophy in Mathematics and participates in the pro-
gram leading to the B.S. in Mathematical and Computational Science. The department also participates in the M.S. and Ph.D. degree programs in Scientific Computing and Computational Mathematics.

ADVANCED PLACEMENT FOR FRESHMEN

Students of unusual ability in mathematics often take one or more semesters of college-equivalent courses in mathematics while they are still in high school. Under certain circumstances, it is possible for such students to secure both advanced placement and credit toward the bachelor’s degree. A decision as to placement and credit is made by the department after consideration of the student’s performance on the Advanced Placement Examination in Mathematics (forms AB or BC) of the College Entrance Examination Board. This examination is the only one used for granting credit. The department does not give its own advanced placement examination. Students can receive either 5 or 10 units of advanced placement credit, depending on their scores on the Advanced Placement Examination. Entering students who have credit for two quarters of single variable calculus (10 units) are encouraged to enroll in Math. 51-53 in multivariable mathematics, or the honors version 51H-53H. These three-course sequences, which can be completed during the freshman year, supply the necessary mathematics background for most majors in science and engineering. They also serve as excellent background for major or minor degrees in Mathematics, or in Mathematical and Computational Science. Students who have credit for one quarter of single variable calculus should take Math. 42 in the Autumn Quarter and 51 in Winter Quarter. Options available in the Spring Quarter include Math. 52, 53, 103, or 130. For proper placement, contact the Department of Mathematics.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

The following department requirements are in addition to the University’s basic requirements for the bachelor’s degree.

1. Calculus
   a) Calculus in one variable (Math. 41, 42; or 19, 20, 21). These courses should be completed by the end of the first year.
   b) Calculus in several variables (Math. 51, 52; or 51H, 52H).

2. A total of 30 units in mathematics courses numbered 100 or above, or 53, or 53H (excluding 103, 104, and 109) distributed as follows: four in algebra or number theory, four in analysis, and two in geometry, topology, or foundations, at least one of which must be in geometry or topology. These are typically chosen among: algebra—113, 120, 121, plus one additional course chosen among 114, 152, 155, 156; analysis—53 or 53H, 106, 115, 130, 131, 132, 134A,B, 171, 173, and 175; geometry—any of the courses numbered in the 140s; foundations—160A,B, 161, 162. Note that courses 103, 104, and 109 do not satisfy algebra requirements. Graduate courses in the same subject may be substituted for the preceding courses; for example, 206A for 106.

3. Five additional courses, each of at least 3 units, chosen from courses numbered 100 or above. Mathematics majors must have a grade point average (GPA) of at least ‘C’ in all courses used to fulfill the major requirement. Letter grades are required in all courses used to fulfill the major requirement except for those offered Satisfactory/No Credit only and for cognate courses (see item 4, below).

   Students planning graduate study in mathematics are advised to include one or more 200-level courses in their programs and, to facilitate this, to complete 113, 114, and 115 or 171 as early as possible. Students intending to go on to graduate work in mathematics are also urged to study at least one foreign language chosen from French, German, or Russian.

4. One of the following options (the choice of ‘a’ or ‘b’ is recommended):
   a) Physics 41, 43, 45, 47 or 61, 63, 65.
   b) Any four quarters of physics lecture courses numbered 41 or above.
   c) A series of courses within which mathematics is applied in a significant manner. Students choosing this option must have their plans approved by the department’s Committee on Undergraduate Affairs.

   Variations in the basic program described above are possible. In particular, students interested in applied mathematics may obtain the B.S. in Mathematics by taking a suitable program of courses in a field of application of mathematics in place of some of the courses prescribed above. Individual programs in such cases must be approved by the department’s Committee on Undergraduate Affairs.

To receive a department recommendation for graduation, a student must have been enrolled as a major in the department for at least two full quarters, including the last full quarter before graduation, and must complete at least 15 units of 100 (or higher) level courses in the department.

MINORS

The Department of Mathematics offers two minor programs, one for students with majors in the technical subjects (science, engineering, or earth sciences), and one for students in non-technical majors. Both programs require students to
gain some familiarity with the core areas of analysis and modern algebra, while allowing for flexibility through additional electives.

Non-Technical Majors—
1. Calculus through Math. 51 or 51H
2. Analysis: 115 or 171 plus one additional course in analysis or differential equations such as Math. 53, 53H, or 130
3. Algebra: 109 or 120
4. Two electives

Technical Majors—
1. Analysis: 53, 53H, or 130, either 115 or 171, plus one additional course in analysis.
2. Algebra: completion of 53, 103 or 113, and 109 or 120
3. Three electives

Electives are any mathematics courses numbered 100 or higher. Consult with the department’s Director of Undergraduate Advising to resolve any questions.

HONORS PROGRAM
The Department of Mathematics program leading to the degree of B.S. in Mathematics with Honors is intended for students who have strong theoretical interests and abilities in mathematics. The goal is to give students a strong background in the three basic areas of pure mathematics: analysis, algebra, and geometry. Through the honors thesis program, a student is introduced to current mathematical research. The program provides an excellent background with which to enter a Ph.D. program in Mathematics.

The basic requirement for entry is the completion of Math. 53 or 53H or, equivalently, Math. 44, 113, and 130. Beyond this level, fourteen 3-unit math courses are required, as well as successful completion of a senior thesis. Of the fourteen courses, 106, 114, 120, 134A,B, 171, and 173 are required. In addition, a student must take two geometry/topology courses numbered in the 140s, one algebra course numbered in the 150s, or 121 and one course in probability or set theory (160A or 161, Statistics 116). At least three other courses numbered above 110 are required. Students are urged to include graduate-level courses numbered above 200, particularly 205A.

In addition to course requirements, an honors student must write a senior thesis worth 6 units of credit, which generally takes two quarters to complete. Typically, at the end of the junior year the student chooses a thesis adviser from the Mathematics faculty, and the adviser and the student together map out a concentrated reading program. In the senior year, the thesis is written under the direction of the adviser, on a problem or set of problems in the chosen area of study. The thesis may consist of original material or be a synthesis of work in the current research literature.

Beyond these requirements, the honors major has the same physics/applied math requirements as the regular major (see item 4 above). Below is a typical mathematics curriculum of an honors Mathematics major:

<table>
<thead>
<tr>
<th></th>
<th>Autumn</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>51H</td>
<td>52H</td>
<td>53H</td>
</tr>
<tr>
<td>Sophomore</td>
<td>120</td>
<td>134A</td>
<td>134B</td>
</tr>
<tr>
<td>Junior</td>
<td>143</td>
<td>4 electives</td>
<td>140s and 150s</td>
</tr>
<tr>
<td>Senior</td>
<td>206A</td>
<td>205A</td>
<td>205B</td>
</tr>
</tbody>
</table>

Students with questions about the honors program should see the Director of Undergraduate Advising.

BACHELOR OF SCIENCE IN MATHEMATICAL AND COMPUTATIONAL SCIENCE
The Department of Mathematics participates with the Departments of Computer Science, Engineering-Economic Systems and Operations Research, and Statistics in a program leading to the degree of B.S. in Mathematical and Computational Science. See the “Department of Mathematical and Computational Science” section of this bulletin.

GRADUATE PROGRAMS
MASTER OF SCIENCE
The University’s basic requirements for the master’s degree are discussed in the “Graduate Degrees” section of this bulletin. The following are additional department requirements:

Candidates must complete an approved course program of 36 units beyond the department requirements for the B.S. degree. It must include 18 units in courses numbered 200 or above. The candidate must have a grade point average (GPA) of ‘B’ over all course work taken in mathematics, and a GPA of ‘B’ in the 200-level courses considered separately. Course work for the M.S. degree must be approved during the first quarter of enrollment in the program by the department’s Director of Graduate Studies.

For the degree of M.S. in Computer Science, see the “Computer Science” section of this bulletin.

TEACHING CREDENTIALS
For information concerning the requirements for teaching credentials, see the “School of Education” section of this bulletin or address inquiry to Credential Secretary, School of Education.
MATHEMATICS 587

MASTER OF ARTS IN TEACHING (MATHEMATICS)

In cooperation with the School of Education, the department offers a program leading to a Master of Arts in Teaching (Mathematics). It is intended for candidates who have a teaching credential or relevant teaching experience and wish to strengthen their academic preparation. Detailed requirements are outlined under the “School of Education, Master of Arts in Teaching” section of this bulletin.

DOCTOR OF PHILOSOPHY

The University’s basic requirements for the doctorate (residence, dissertation, examination, and so on) are discussed in the “Graduate Degrees” section of this bulletin. The following are additional department requirements.

To be admitted to candidacy, the student must have successfully completed 27 units of graduate courses (that is, courses numbered 200 and above). In addition, the student must pass qualifying examinations given by the department.

Beyond the requirements for candidacy, the student must complete a course of study of at least 48 units approved by the Graduate Affairs Committee of the Department of Mathematics and submit an acceptable dissertation. The course program should display substantial breadth in mathematics outside the student’s field of application. The student must receive a GPA of ‘B’ or better in courses used to satisfy the Ph.D. requirement. In addition, the student must pass the University oral examination and pass a reading examination in two foreign languages, chosen from French, German, or Russian.

Experience in teaching is emphasized in the Ph.D. program. Each student is required to complete nine quarters of such experience. The nature of the teaching assignment for each of those quarters is determined by the department in consultation with the student. Typical assignments include teaching or assisting in teaching an undergraduate course or lecturing in an advanced seminar.

For the Ph.D. degree in Computer Science, see the “Computer Science” section of this bulletin.

For further information concerning degree programs, fellowships, and assistantships, inquire of the academic associate of the department.

APPLIED MATHEMATICS OPTION

This option differs from the standard Ph.D. program in that qualifying examinations in more applied areas are substituted for the regular qualifying examinations. Also, the courses Math. 220 (basic methods in partial differential equations) and Computer Science 237 (numerical methods) are a required part of the curriculum in the first year. Students are required to take 18 units of graduate-level courses in computer science and applied areas such as fluid mechanics, operations research, financial mathematics, or statistics.

Ph.D. MINOR

The student should complete both of the following:*  
1. Math. 106, 131, 132  
2. Math. 113, 114, 120 or 152

These courses may have been completed during undergraduate study, and their equivalents from other universities are acceptable.

In addition, the student should complete 21 units of 200-level courses in mathematics. These must be taken at Stanford and approved by the Department of Mathematics’ Ph.D. minor adviser.

* A third coherent sequence designed by the student, subject to the approval of the graduate committee, may be considered as a substitute for items 1 or 2.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

INTRODUCTORY AND UNDERGRADUATE

The department offers two sequences of introductory courses in single variable calculus.

1. Math. 41, 42 present single variable calculus. Differential calculus is covered in the first quarter, integral calculus in the second.

2. Math. 19, 20, 21 cover the material in 41, 42 in three quarters instead of two.

There are options for studying multivariable mathematics:

1. Math. 51, 52, 53 cover differential and integral calculus in several variables, linear algebra, and ordinary differential equations. These topics are in an integrated fashion and emphasize application. Math. 51 covers differential calculus in several variables and introduces matrix theory and linear algebra, 52 covers integral calculus in several variables and vector analysis, 53 studies further topics in linear algebra and applies them to the study of ordinary differential equations. It is strongly recommended for incoming freshmen with 10 units of Advanced Placement credit.

2. Math. 51H, 52H, 53H cover the same material as 51, 52, 53 but with more emphasis on theory and rigor.

The introductory course in modern algebra is Linear Algebra (103 or 113). There are no formal prerequisites for these courses, but appropriate mathematical maturity is expected. The material in 103 is covered in the sequence 51, 52, 53.

19,20,21. Calculus—The content is the same as the sequence 41 and 42 described below, over three
19. Calculus—GER:2c (DR:4)
    3 units, Aut (Bronski)
    Win (Biran)
    Sum (Staff)
20. Calculus—Continuation of 19. Prerequisite: 19. GER:2c (DR:4)
    3 units, Win (Rumelhart)
    Spr (Etnyre)
21. Calculus—Continuation of 20. Prerequisite: 20. GER:2c (DR:4)
    4 units, Spr (Brock)
41, 42.—Three large lecture classes per week plus two classes in small sections.
41. Single Variable Calculus—Introduction to differential and integral calculus of functions of one variable. Topics: review of elementary functions including exponentials and logarithms, rates of change and the derivative. Prerequisites: algebra, trigonometry. GER:2c (DR:4)
    5 units, Aut (Brumfiel)
42. Single Variable Calculus—Continuation of 41. Methods of symbolic and numerical integration, applications of the definite integral, introduction to differential equations. Prerequisite: 41 or equivalent. GER:2c (DR:4)
    5 units, Aut (Schwarz)
44. Calculus—Line and surface integrals. The basic theorems of vector analysis (Green's, Stokes, and Divergence).
    3 units, Aut (Goldfarb, Staffilani)
51, 52, 53. Multivariable Mathematics—Recommended for incoming freshmen with 10 units of Advanced Placement credit, and for those interested in science, engineering, or economics. Provides an integrated treatment of multivariable calculus, linear algebra, and ordinary differential equations involving numerical algorithms and computer experiments. Applications are stressed.
51. Linear Equations and Differential Calculus of Several Variables—Geometry and algebra of vectors, systems of linear equations, matrices, vector valued functions and functions of several variables, partial derivatives, gradients, chain rule in several variables, vector fields, optimization. Prerequisite: completion of 21, 42, or a score of at least 4 on the BC Advanced Placement Examination or on the AB Advanced Placement Examination, or consent of the instructor. GER:2c (DR:4)
    5 units, Aut (White)
    Win (Li)
    Spr (T. P. Liu)
52. Integral Calculus of Several Variables—Iterated integrals, line and surface integrals, vector analysis with applications to vector potentials and conservative vector fields, physical interpretations, numerical methods. Similar to 44; makes use of techniques from matrix theory. Prerequisite: 51 and some background in matrix theory (e.g., Math. 103).
    5 units, Win (Kerckhoff)
    Spr (Bump)
53. Ordinary Differential Equations with Linear Algebra—Linear ordinary differential equations, applications to oscillations, matrix methods, including determinants, eigenvalues and eigenvectors, matrix exponentials, and solving of systems of linear differential equations with constant coefficients, numerical methods, Laplace transforms. Similar to 130, integrated with topics from linear algebra (103, 104). Prerequisites: 51 and some background in matrix theory (e.g., Math. 103).
    5 units, Win (K. Liu)
    Spr (Staffilani)
51H, 52H, 53H. Honors Calculus—(Formerly 43H, 44H, 45H.) For prospective math majors in the honors program or other areas of science or engineering who have a strong mathematics background. Three-quarter sequence, beginning in Autumn, covers 43, 44, 113, and 130 (or, equivalently, 51, 52, and 53) with additional advanced calculus and ordinary and partial differential equations. Provides a unified treatment of multi-variable calculus, linear algebra, and differential equations with a different order of topics and emphasis from standard courses. Students should know one-variable calculus and have an interest in a theoretical approach to the subject. Prerequisite: score of 5 on BC Advanced Placement Exam or consent of the instructor. Recommended: complete at least the first two quarters.
    51H satisfies GER:2c (DR:4)
    5 units, Aut (Mazzeo)
    Win (Eliashberg)
    Spr (White)
80Q. Stanford Introductory Seminar: Capillary Surfaces—Preference to sophomores.
    3 units, Win (Finn)
    not given 1997-98
    not given 1997-98
    1 unit, Aut (Zhao)
84Q. Stanford Introductory Seminar: Bioinformatics—Preference to sophomores.
    3 units, Aut (Brendel, Karlin)
2 units, Spr (Bronski)

UNDERGRADUATE AND GRADUATE

Unless explicitly stated, there are no prerequisites for the courses listed below. Where a prerequisite is stated, it may be waived by the instructor.

103. Matrix Theory and its Applications—Linear algebra and matrices, emphasizing computational and algorithmic aspects and the scientific problems in which matrix theory is applied. Solution of linear equations. Linear spaces and matrices. Orthogonal projection and least squares. Introduction to eigenvalues and eigenvectors. GER:2c (DR:4)
3 units, Aut (Benveniste, Biran, Chen, Rumelhart)
Win (Papanicolaou, Etnyre, Biran, Teleman)
Spr (Goldfarb, Li, Teleman)
Sum (Staff)

3 units, Win (Benveniste, Biran, Chen, Rumelhart)
Spr (Papanicolaou)

106. Introduction to Theory of Functions of a Complex Variable—Complex numbers, analytic functions, Cauchy-Riemann equations, complex integration, Cauchy formula; elementary conformal mappings. Prerequisite: 44 or 52.
3 units, Aut (Brock)
Spr (Schwarz)
Sum (Staff)

109. Modern Algebra and its Applications—Same as 120, but emphasis on applications of modern algebra including symmetry and crystallographic groups, and error-correcting codes. Prerequisite: 103, 113, or equivalent.
3 units, Aut (Li)

113. Linear Algebra and Matrix Theory—Algebraic properties of matrices and their interpretation in geometric terms. Relationship between the algebraic and geometric points of view and matters fundamental to the study and solution of linear equations. Topics: linear equations, vector spaces, linear dependence, bases and coordinate systems; linear transformations and matrices; similarity; eigenvectors and eigenvalues; diagonalization. (WIM)
3 units, Aut (Ornstein)
Win (Milgram)

114. Linear Algebra and Matrix Theory—Continuation of 113. Deeper study of 113 topics plus additional topics from invariant subspaces, canonical forms of matrices; minimal polynomials and elementary divisors; vector spaces over arbitrary fields; inner products; Jordan normal forms; Hermitian and unitary matrices; multilinear algebra.
3 units, Win (Rubin)
Spr (Milgram)

3 units, Aut (Benveniste)
Win (Brumfiel)
Sum (Staff)

120. Modern Algebra I—Basic structures in algebra: groups, rings, and fields. Elements of Group Theory: permutation groups, finite Abelian groups, p-groups, Sylow theorems. Polynomial rings, principal ideal domains, unique factorization domains. (WIM)
3 units, Aut (Bump)

121. Modern Algebra II—Continuation of 120. Fields of fractions. Solvable and simple groups. Elements of field theory and Galois theory. Prerequisite: 120.
3 units, Win (Goldfarb)

124. Introduction to Stochastic Processes—Elementary systematic account of several principal areas in stochastic processes including branching processes, Markov chains, Poisson processes. Applications relevant to the natural, biological, social, and managerial sciences.
not given 1997-98

130. Ordinary Differential Equations—Special, exact, and linear equations; series solutions, numerical solution; Laplace transform; systems of equations. Students with some background in matrix theory should take 53, which integrates linear algebra with differential equations. Pre- or corequisite: 44 or 52, or consent of instructor.
3 units, Aut (Dembo, Goldfarb)
Win (Katznelson, Schoen)
Spr (Benveniste, Biran)
Sum (Staff)

3 units, Win (Chen)
Spr (T. P. Liu)

3 units, Spr (Schoen)

134A,B. Honors Analysis—Primarily for students planning graduate work in mathematics of physics who would normally enroll in an honors sequence. Required of honors math majors, but of use and interest to other majors at ease with rigorous proofs and qualitative discussion. Coherent, mathematically sophisticated presentation of basic areas in classical real analysis. Emphasis on ordinary and partial differential equations. Prerequisites: 53H, or 113 and 130, and 171, or consent of instructor.

3 units, Win, Spr (P. Cohen)

141. Higher Geometries—Study of various geometries, including projective, affine, and non-Euclidean geometry. Prerequisite: 113.

not given 1997-98


3 units, Aut (K. Liu)

145. Algebraic Geometry—Affine and projective spaces, plane curves, Bezout’s theorem, singularities and genus of a plane curve, applications of commutative algebra to geometry. Prerequisites: 120, 121.

3 units, Win (R. Cohen)

147. Differential Topology—Smooth manifolds, transversality, Sard’s theorem, embeddings, degree of a map, Borsuk-Ulam theorem, Hopf degree theorem, Jordan Curve Theorem. Prerequisites: 115 or 171, 173.

3 units, Spr (Donaldson)

148. Algebraic Topology—Fundamental group, covering spaces, Euler characteristic, classification of surfaces, knots. Prerequisites: 120, 171.

not given 1997-98

152. Elementary Theory of Numbers—Euclid’s algorithm, fundamental theorems on divisibility; prime numbers, congruence of numbers; theorems of Fermat, Euler, Wilson; congruence of first and higher degrees; Lagrange’s theorem, its applications; residues of power; quadratic residues; introduction to theory of binary quadratic forms.

3 units, Aut (Rubin)

153. Combinatorics—Topics in Ramsey’s theorem, generating functions, partition functions, and in number theory (sums of integers and van der Waerden’s theorem). Recommended; general background in algebra, analysis, and some number theory.

3 units, Spr (K. Liu)

155. Geometrical Groups—The rotation and unitary groups emphasizing two, three, and four dimensions. Quarterions. The Lorentz group and SL(2,C). Prerequisites: 113, 120, or consent of instructor.

not given 1997-98

156. Group Representations—Designed for undergraduates. Experimental, primarily examining symmetries on objects such as vector spaces (“group representations”), geometric objects (“geometric group actions”), and discrete sets (combinatorics). Topics: group representations and their characters, classification of permutation representations using partitions and Young tableaus, group actions on sets and the Burnside ring, and spherical space forms. Prerequisites: basic knowledge of linear algebra (51-53, 103 or 113) and Group Theory (109 or 120).

3 units, Win (Milgram)

160A. First-Order Logic—(Enroll in Philosophy 160A.)

160B. Computability and Logic—(Enroll in Philosophy 160B.)


3 units, Spr (Schwarz)

162. Philosophy of Mathematics—(Enroll in Philosophy 162.)

171. Fundamental Concepts of Analysis—Recommended for math majors and required of honors math majors. Similar to 115 but altered contents and more theoretical orientation. Properties of Riemann integrals, continuous functions and convergence in metric spaces; compact metric spaces, basic point set topology. Prerequisite: 51H, 52H, 53H, or equivalent. (WIM)

3 units, Aut (Staffilani)


3 units, Win (R. Cohen)

175. Elementary Functional Analysis—Linear operators on Hilbert space. Spectral theory of compact operators; applications to integral equations. Elements of Banach space theory. Prerequisite: 171.

3 units, Spr (Benveniste)

176. Spectral Geometry—Relations between geometry of a region and eigenvalues of the Laplace operators, starting from an introductory level. Basic properties of the Laplace and heat operators devel-
oped and applied to studying "when one can hear the shape of a drum." Prerequisites: familiarity with vector calculus, ordinary differential equations, and linear algebra.

not given 1997-98

181. Topics in the History of Mathematics: From Antiquity to the 17th Century—(Enroll in History and Philosophy of Science 140, Philosophy 140.)

195. Teaching Practicum—Students assist in an undergraduate course, lead problems sessions, and tutor. Some reading in topics in mathematics education is required.

1 unit, Aut, Win, Spr

197. Senior Honors Thesis

1-6 units, Aut, Win, Spr (Staff)

199. Independent Work—Undergraduates pursue a reading program. Topics limited to those not in regular department course offerings. Credit can fulfill the elective requirement for math majors. Approval of Undergraduate Affairs Committee required to use credit for department’s area requirement. Consult academic secretary for help in finding an adviser.

(Staff)

PRIMARILY FOR GRADUATE STUDENTS

200. Graduate Problem Seminar

not given 1997-98

205A. Theory of Functions of a Real Variable—Lebesgue measure and integration, LP spaces and convergence theorems. Prerequisite: 171 or equivalent.

3 units, Aut (Simon)
Spr (Ornstein)


3 units, Win, Spr (Simon, Katznelson)


3 units, Aut (P. Cohen)

206B. Theory of Functions of a Complex Variable—Riemann mapping theorem, product developments, entire functions, elliptic functions, Dirichlet problem, Picard’s theorem. Prerequisites: 171, 206A.

3 units, Win (P. Cohen)

210A. Modern Algebra—Groups, rings and fields, Galois theory, ideal theory. Prerequisite: 120 or equivalent.

3 units, Aut (Bump)

210B,C. Modern Algebra—Introduction to algebraic geometry representation of groups and rings, multilinear algebra. Prerequisites: 120 or equivalent, 206A.

3 units, Win, Spr (Brumfiel, Milgram)

216. Introduction to Algebraic Geometry—Algebraic varieties, sheaves, cohomology, and Riemann-Roch theorem. Hodge theory, Lefschetz decompositions and hyperplane theorem. Curves and surfaces classification theorem. Prerequisite: 120 or equivalent.

not given 1997-98


3 units, Win, Spr (Donaldson)


220A. 3 units, Aut (Zhao)
220B. 3 units, Win (Papanicolaou)
220C. 3 units, Spr (Papanicolaou)

221A. Calculus of Variations—Euler-Lagrange equations, sufficient conditions; applications to eigenvalue and scattering problems; direct methods, Dirichlet’s principle.

not given 1997-98

224. Integral Equations

not given 1997-98

226. Topics in Applied Mathematics

3 units, Spr (Zhao)

227. Mathematical and Computational Molecular Biology—Emphasis is on concepts and principles, combined with hands-on applications. Topics: probability models for letter sequences, score-based sequence analysis, amino acid substitution scoring matrices, dynamic programming and other methods for sequence alignment, phylogenetic trees from sequence data, signal search methods, codon usage, exon-intron prediction.

3 units, Win (Brendel)

228A. Introduction to Ergodic Theory—Measure preserving transformations and flows, ergodic theorems, mixing properties, spectrum, Kolmogor-
ov automorphisms, entropy theory. Examples. Prerequisites: 205A, 205B.

not given 1997-98

228B. Introduction to Ergodic Theory—Classical dynamical systems, mostly geodesic and horocycle forms on homogeneous spaces of SL (2,R). Prerequisites: 205A, 205B.

not given 1997-98


not given 1997-98

234. Large Deviations—Combinatorial estimates and the method of types. Large deviation probabilities for partial sums and for empirical distributions, Cramér’s and Sanov’s theorems and their Markov extensions. Application in statistics, information theory, and statistical mechanics. Prerequisite: 230A or Statistics 310.

3 units, Aut (Dembo)

235A,B. Selected Topics in Ergodic Theory—Topics from the Kolmogorov-Sinai theory of entropy; the isomorphism theorem for Bernoulli shifts and Bernoulli flows; K-automorphisms applications to mechanical systems, and automorphisms of compact groups.

3 units, Aut, Win (Ornstein)


not given 1997-98


not given 1997-98

242. Difference Equations

not given 1997-98

244. Riemann Surfaces—Compact Riemann surfaces: topological classifications, Hurwitz’ formula. Riemann-Roch formula, uniformization theorem. Abel’s theorem, Jacobian varieties. Some elements of harmonic analysis are developed with applications. Methods generally applicable to algebraic curves highlighted.

3 units, Aut (Donaldson)

245A,B. Quasiconformal Mappings—Geometric and differential properties, existence theorems, applications. Prerequisite: 205.

not given 1997-98


not given 1997-98

248A,B. Analytic Number Theory—The theory of modular forms.

not given 1997-98

249. Topics in Representation Theory and Number Theory—Euler systems for p-adic Galois representations. Using Euler systems to bound Selmer groups. Examples of Euler systems and applications to ideal class groups and elliptic curves. Connections with Iwasawa theory and p-adic L-functions.

3 units, Aut (Rubin)

250. Complex Dynamics—The behavior of holomorphic maps (especially rational maps) under iteration. Topics: fixed and periodic points, Siegel dics, Fatou sets, Julia sets, Sullivan’s theorem on non-wandering sets, the Mandelbrot set, etc. Prerequisite: 206A or equivalent. Recommended: 206B, 250.

not given 1997-98

252A. Matrix Theory and Inequalities

not given 1997-98

253. Regularity of Sets and Mappings—For students interested in any area of analysis. Topics: Lipschitz functions, $C^\infty$ functions, Sobolev functions, various regularity and extension theorems, including Rademacher, Kirzbraun, Whitney, Sard, $C^1$-Sard. Critical sets of real-analytic, complex analytic functions. Affine approximation properties of subsets of $R^n$, including a discussion of rectifiability and non-rectifiability, structure theorem, and Reifenberg’s topological disc theorem.

3 units, Win (Simon)

254A,B. Ordinary Differential Equations—Qualitative theory of ordinary differential equations, analytic and geometric methods. Topics from the stability and perturbation theory of dynamical systems; Hamiltonian systems; applications to the theory of oscillations and celestial mechanics.

not given 1997-98

255A,B. Dynamics on the Circle and Annulus—Known results on dynamics on the circle and in the annulus, avoiding much of the classical formalism (KAM, implicit function theorem). Topics: aspects of the smoothness of the conjugation of circle diffeomorphisms, existence and smoothness of invariant curves for twist maps and other maps.

not given 1997-98

not given 1997-98


not given 1997-98

257A,B. Symplectic Geometry and Topology—Linear symplectic geometry and linear Hamiltonian systems. Symplectic manifolds and their Lagrangian submanifolds—local properties. Symplectic geometry and mechanics. Contact geometry and contact manifolds. Relations between symplectic and contact manifolds. Hamiltonian systems with symmetries. Momentum map and its properties.  

3 units, Aut, Win (Eliashberg)

259. Microlocal Analysis—The basic calculus of pseudodifferential operators, focusing on the parametrix construction for elliptic operators, leading to various applications in geometry (Hodge theorem, index theorem for Dirad operators). Possible topics: pseudodifferential operators on singular and noncompact spaces, the microlocal theory of elliptic boundary value problems, Atiyah-Patodi-Singer index theorem.  

not given 1997-98


not given 1997-98


not given 1997-98


not given 1997-98


not given 1997-98

267A,B. Harmonic Analysis—Topics from the "L^2" theory of harmonic analysis—the singular integral theory of Calderon and Zygmund and its extensions, interpolation of operators, multiplier transformations, and smoothness properties of functions: sets of uniqueness for trigonometric series, spectral synthases, thin sets, spectral theory of convolution operators, and applications. Prerequisite: knowledge of the elements of Fourier analysis.  

3 units, Aut, Win (Katznelson)


not given 1997-98


not given 1997-98

272A,B. Topics in Partial Differential Equations—Introduction to PDE methods in an intrinsic geometric setting. Topics: Schauder and DeGiorgi-Nash theory in a geometric setting, Sobolev, Poincare, and isoperimetric inequalities. Discussion of nonlinear methods: Leray-Schauder fixed point and degree methods and variational methods. Geometric examples introduce basic nonlinear PDEs of geometry (the harmonic map, Yang-Mills, and mean curvature equations) and equations arising from scalar and Ricci curvature. Prerequisite: knowledge of differential geometry through 217A.  

3 units, Win, Spr (Schoen)

274. Wave Propagation—Basic concept, waves, wavefronts, rays; phase and amplitude functions; ray, eikonal, and transport equations; reflection, transmission, edge diffraction, and surface diffraction coefficients; asymptotic expansions, wave equations. Applications to electromagnetic, acoustic, elastic, and other types of waves.  

not given 1997-98
276A. Dynamical Systems—(Enroll in Mechanical Engineering 233A.)
276B. Numerical Analysis of Dynamical Systems—(Enroll in Mechanical Engineering 233B.)
277. Mathematical Theory of Relativity—Ricci calculus; variational principles and covariance properties; differential geometry of space-time; Cauchy’s problem for the differential equations of gravitation and electromagnetism; relativistic hydrodynamics; unified field theories.
   not given 1997-98
281A, B. Introduction to Algebraic and Differential Topology—Fundamental group, covering spaces, embeddings and immersions of manifolds, transversality, homotopy theory, homology and cohomology of complexes, differential forms, fiber and vector bundles and their characteristic classes.
   3 units, Aut, Win (Kerckhoff)
282. Moduli Spaces
   not given 1997-98
   3 units, Spr (R. Cohen)
284. Introduction to Topology of Real Algebraic Varieties—The tools developed and results obtained during the last decades in relation to the first part of the 16th Hilbert problem concerning the topology of real algebraic varieties. Emphasis is on the arrangements of ovals and plane curves and topology of algebraic surfaces in real 3-space. Prerequisite: basic algebraic topology and elementary notions from algebraic geometry.
   3 units, Win (Kharlamov)
285A. Geometric Measure Theory—Hausdorff measures and dimensions, area and co-area formulas for Lipschitz maps, integral currents and flat chains, minimal surfaces and their singular sets.
   not given 1997-98
   3 units, Win, Spr (Feferman)
291A, B. Set Theory—The basics of Zermelo Fraenkel set theory. Topics: cardinal and ordinal numbers, the cumulative hierarchy and axiom of choice, and the universe of constructible sets. Models of set theory, including admissible sets, and models constructed by forcing. Prerequisites: 160A, B and 162, or equivalents.
   not given 1997-98
292A, B. Proof Theory—Gentzen’s natural deduction and/or sequential calculi for first-order predicate logic. Normalization respectively cut-elimination procedures. Extensions to infinitary calculi; ordinal complexity of proof trees. Subsystems of analysis and their reduction to constructive theories. Prerequisites: 160A, B and 162, or equivalents.
   not given 1997-98
293A, B. Set Theory—The basics of Zermelo Fraenkel set theory. Topics: cardinal and ordinal numbers, the cumulative hierarchy and axiom of choice, and the universe of constructible sets. Models of set theory, including admissible sets, and models constructed by forcing. Prerequisites: 160A, B and 162, or equivalents.
   not given 1997-98
294. Topics in Logic—Extraction of bounds from proofs. Functional interpretation of constructive proofs, elimination of the axiom of choice. Prerequisite: 160A or equivalent.
   not given 1997-98
295. Topics in the Philosophy of Mathematics—Surveys various views on the philosophy of mathematics. Topics: The Three Foundational Crises; the Greek view and Platonism; the views of Frege, Russell, Hilbert, and Brouwer; Bishop’s Constructive Analysis; pragmatism. An articulation of a Formalist View of Mathematics. Prerequisite: 205 or consent of instructor.
   not given 1997-98
296. Logic and Set Theory—Basic theorems of logic. Completeness and incompleteness theorems, Lowenheim-Skolem, etc. Development of axiomatic set theory leading to undecidability theorems on Continuum Hypothesis and Axiom of Choice. Accessible to non-specialists without previous background in logic.
   not given 1997-98
300. Directed Reading
   any quarter (Staff)
301. Seminar Participation—Participation in a student-organized graduate seminar under the general supervision of a faculty member.
   any quarter (Staff)
306. Advanced Reading and Research
   any quarter (Staff)
307. Seminar Participation—Participation in a faculty-led seminar which has no specific course number.
   any quarter (Staff)
308. Seminar in Applied Mathematics
   by arrangement
381. Seminar in Analysis  
   by arrangement
383. Seminar in Function Theory  
   by arrangement
385. Seminar in Abstract Analysis  
   by arrangement
386. Seminar in Geometry and Topology  
   by arrangement
387. Seminar in Algebra and Number Theory  
   by arrangement
388. Seminar in Probability and Stochastic Processes  
   by arrangement
389. Seminar in Mathematical Biology  
   by arrangement
391. Seminar in Logic and the Foundations of Mathematics  
   by arrangement

MEDIEVAL STUDIES

Chair: George Brown  
Committee in Charge: George Brown, Philippe Buc, William Mahrt, Jennifer Summit  
Affiliated Faculty: George H. Brown (English), Philippe Buc (History), Brigitte Cazelles (French and Italian), Hester Gelber (Religious Studies) (Oxford Autumn, on leave Winter, Spring), Eric Lawee (Religious Studies), Seth Lerer (English), Suzanne Lewis (Art), William Mahrt (Music), Kathryn Miller (History), Sara S. Poor (German Studies), Orrin W. Robinson (German Studies), Jeffrey Schnapp (French and Italian, and Comparative Literature), Jennifer Summit (English)

The Medieval Studies Program is administered through Humanities Special Programs. Although there is no formal undergraduate degree program, students may propose individually designed majors in Medieval Studies. Such majors must be proposed to and approved by the Dean of Undergraduate Studies’ Advisory Committee on Individually Designed Majors. Guidelines may be found under the “Program for Individually Designed Majors” section of this bulletin. Students interested in planning a course of studies should consult the Chair of Medieval Studies. Additional information about this option, as well as referral to faculty advisers, is available through the Humanities Special Programs office. For information about proposing individually designed majors, students should go to the Undergraduate Advising Center. Students who are members of the Humanities Honors Program may petition to major in Humanities with a self-designed program in Medieval Studies. See the “Humanities Special Programs” section of this bulletin. The major is normally declared by the beginning of the student’s third year.

The major combines interdisciplinary breadth with a disciplinary focus. The interdisciplinary emphasis is provided by 165, Introduction to Medieval Culture, by upper-level interdisciplinary colloquia, and by the requirement that students take courses in three different areas. Depth is ensured by the requirement that students take at least four courses in one area. A faculty adviser helps each student choose courses that integrate the requirements of breadth and depth. To that end, the following guidelines are provided.

The student should take a minimum of ten courses dealing directly with the Middle Ages and distributed as follows:
1. The introductory course, Medieval Studies 165, Introduction to Medieval Culture
2. Two upper-level interdisciplinary courses in medieval subjects
3. Four courses in one of the following categories:  
   a. Literature: English, French, German and Scandinavian, Italian, Latin, Slavic, Spanish
   b. History
   c. Art history, drama, music
   d. Humanities, philosophy, religious studies (certain Humanities courses may fulfill requirements within other categories).
4. Two courses in a second category from the above list
5. One course in a third category from the above list

In addition to the ten courses, a language proficiency equal to two years of college-level study is suggested in Latin or one of the following: French, German, Italian, or Spanish.

MINORS

An undergraduate minor in Medieval Studies is available through the program. Students interested in completing the minor should inquire about enrollment procedures at the office of Humanities Special Programs.

Requirements:
1. Language: in addition to the University foreign language requirement, at least a one-quarter course in a classical and/or medieval vernacular language is recommended, which may count as one of the five required courses for the minor listed under item 2a.
2. The minor consists of six courses, which include:
   a) Medieval Studies 165, Introduction to Medieval Culture (core course, given annually)
   b) An additional five courses dealing directly with the Middle Ages. If the student's major department or program offers medieval
courses, he/she should take two of them for the Medieval Studies minor, but those courses may not also count for the major. At least three courses must be taken outside the student’s major, selected from two or more of the following categories:
1) Language and literature
2) History
3) Art history, drama, music
4) Humanities, philosophy, religious studies
5) From among the Medieval Studies faculty listed above, the student chooses an adviser, who assists in the selection of courses and the design of the program.

**COURSES**

165. Introduction to Medieval Culture—(Same as English 165A, History 105A.) Introduction to the development of medieval culture through religious, philosophical, literary, artistic, social, and political sources with emphasis on the interrelationships among them. Lectures by faculty from various departments. GER:3a (DR:7 or 8)
5 units, Spr (Brown, Miller)

**RELATED AREAS**

Courses suitable for self-designed majors in Medieval Studies are listed below. More detailed course descriptions are found under the various department headings. See quarterly Time Schedule for changes in listings.

**ART**

105/205. Sites and Images of Power in 12th-Century Europe
129A/229A. Painting in Late Medieval and Early Modern Japan, 1500-1868

**ENGLISH**

60/160. The English Bible
65B/165B. Arthurian Literature
110. Masterpieces of English Literature I: Chaucer, Shakespeare, Milton, and their Contemporaries
171. Chaucer
181E. Seminar: Versions of Troilus and Cressida
211. Readings in Middle English

**FRENCH AND ITALIAN**

208E. Female Saints
214E. Images of the Afterlife
263E. Love Books of the Middle Ages

**FRENCH**

130. Middle Ages and Renaissance France

**ITALIAN**

128. Italian Studies: The Middle Ages and the Renaissance

**GERMAN STUDIES**

38A. Introduction to the Germanic Languages
123N. Stanford Introductory Seminar: The Brothers Grimm and their Fairy Tales
134P. Medieval Women
161B/261B. Medieval Courtly Romance
203. History of the German Language
257. Gothic

**HISTORY**

119. Aristocracies and Absolutism: Early Modern Eastern Europe, 1400-1800
194A. Early and Medieval Japan to 1500
207. Undergraduate Colloquium: Intolerance or Symbiosis? Judaism, Christianity, and Islam
223/323. Undergraduate/Graduate Colloquium: Honor, the Law, and Morality in Early Modern Europe
299. Undergraduate/Graduate Colloquium: Japan in the Age of Courtiers and Warriors, 1180-1333
320A. Graduate Colloquium: Topics in Early Modern Russian Historiography
395A. Graduate Colloquium: Early and Medieval Japan
411. Graduate Seminar: Medieval History

**HUMANITIES**

312. Medieval Seminar

**MUSIC**

140. Studies in Medieval Music

**RELIGIOUS STUDIES**

23. Introduction to Judaism
24. Introduction to Christianity
171. Faith and Politics in the Middle Ages
226. Back to the Sources: Close Readings of the Classical Jewish Texts
323. Medieval Jewish Biblical Exegesis

**SLAVIC LANGUAGES AND LITERATURES**

193. The Orthodox World
211. Introduction to Old Church Slavic
212. Old Russian and Old Church Slavic
213. History of the Russian Literary Language
MODERN THOUGHT AND LITERATURE

Chair: Joel Beinin
Committee in Charge: Joel Beinin, Jane Collier (Winter, Spring) Paulla Ebron (Autumn), Claire Fox, Barbara Gelpi (Autumn), Theodore L. Glasser, Elisabeth Hansot, Shirley Heath, David Palumbo-Liu, Lora Romero, Ramón Saldívar, Debra Satz, Peter Stansky, Robert Weisberg

Affiliated Faculty: Joel Beinin (History), Russel Berman (German Studies, and Comparative Literature), Rudy Busto (Religious Studies, on leave 1997-98), Jane Collier (Anthropology, on leave Autumn), Theodore L. Glasser, Elisabeth Hansot, Shirley Heath, David Palumbo-Liu, Lora Romero, Ramón Saldívar, Debra Satz, Peter Stansky, Robert Weisberg

SPANISH AND PORTUGUESE

SPANISH

150. Spanish Literature I

203. History of the Spanish Language


PORTUGUESE

172E. Portuguese Literature: The Drama of Gil Vicente

173E. Portuguese Poetry in Translation: Middle Ages to Renaissance

MODERN THOUGHT AND LITERATURE

The Program in Modern Thought and Literature is administered through the office of Humanities Special Programs. Although students in the program take courses offered by the Department of English, there is no direct administrative tie between them. The program admits students for the Ph.D. and sponsors an undergraduate major through the Humanities honors program.

UNDERGRADUATE PROGRAMS

HONORS PROGRAM

This undergraduate program is designed for students with a strong commitment to the interdisciplinary study of modern literature (since the 18th century), cultural history, and critical theory. Students planning to concentrate in Modern Thought and Literature must apply for admission to the Humanities honors program and for graduation with honors in Humanities.

Modern Thought and Literature as a major is an option within the Humanities honors program. Students in the program do not need to complete an additional major in another department, but, in order to satisfy the literature requirement below, they normally will have the equivalent of a major in a single national literature. It is in the student's interest to complete the requirements of a department major in order to be able to graduate, should the honors essay not be completed in acceptable form. Honors program requirements include:

1. Admission to the Humanities Honors Program (see the "Humanities Special Programs" section of this bulletin).

2. Humanities 160 (5 units).

3. Two seminars drawn from the series Humanities 191-198, of which one must be Humanities 197 or 198.

4. Honors Essay written from an interdisciplinary perspective (2 units, Spring Quarter, junior year; 5 units each, Autumn and Winter Quarters, senior year). A grade of at least 'B' is required on the essay for graduation with honors in Humanities.

Requirements for the concentration in Modern Thought and Literature include:
1. A statement of purpose articulating the student’s focus and explaining the student’s choice of courses in relation to that focus.

2. Six courses in a single literature and covering a wide range of periods and genres.

3. Three courses, to be chosen in consultation with the adviser, covering major movements in intellectual history since the Enlightenment.

4. One course in the history or philosophy of modern science or technology or its impact on modern culture.

5. One course in modern art or music.

6. One course in history or social science addressing modernization or modernity.

7. Proficiency in a modern foreign language, generally certified by completion of the fifth quarter of college-level language study, or by satisfactory completion of a literature class offered in a foreign language.

Note—With the consent of the adviser, courses on cultural studies may be used to satisfy some part of the Modern Thought and Literature requirements. Students whose main focus is not specifically literary, may propose, with the permission and support of their advisers, a different program of study, the alternative program must keep a balance of approximately six courses from literary disciplines and six courses from non-literary disciplines.

**COTERMINAL PROGRAM**

Each year, one or two undergraduate students, who are exceptionally well-prepared in literature and at least one foreign language and whose undergraduate course work includes a strong interdisciplinary component, may petition to be admitted to the program for the purpose of completing a coterminal A.M. degree. Admission to this program is granted only on condition that in the course of working on their master’s degree they do not apply to enter the Ph.D. program in Modern Thought and Literature. The deadline for application is March 1.

To apply, applicants submit:

1. An unofficial grade sheet from the Credentials Window of the Registrar’s Office or from AXESS.

2. A “Petition for Admission to the Coterminal Program” from Degree Progress, in the Registrar’s Office.

3. A statement giving the reasons the student wishes to pursue this program and its place in his or her future plans. This statement should pay particular attention to the reasons why the student could not pursue the studies he or she desires in some other way.

4. A plan of study listing, quarter by quarter, each course by name, units, and instructor to be taken in order to fulfill the requirements for the degree, including 361, at least 20 units of advanced work in one literature, and at least 20 units in a coherent interdisciplinary program of courses taken in non-literature departments.

5. A writing sample of critical or analytical prose.

6. Two letters of recommendation from members of the faculty who know the applicant well and who can speak directly to the question of his or her ability to do graduate-level work.

**REQUIREMENTS**

The candidate for the A.M. must complete at least 45 units of graduate work, to be divided in the following manner:

1. The introductory seminar, 361, The Modern Tradition (5 units).

2. Twenty units of advanced course work in literature, to be approved by the chair.

3. Twenty units of course work in a coherent and individually arranged interdisciplinary program, to be approved by the chair.

By the end of the course of study, each candidate must also demonstrate a reading knowledge of at least one foreign language.

**GRADUATE PROGRAMS**

The Ph.D. in Modern Thought and Literature is an interdisciplinary program combining work in modern literary/cultural studies with work in one or more other modern disciplines.

The Ph.D. program is designed specifically for students who have a strong interest in literature or culture, but whose approach or focus requires an interdisciplinary program—for example, students interested in anthropological or philosophical approaches to literature and culture; gender studies; ethnic studies; or in topics such as legal humanities, popular culture, and social or cultural theory.

Modern Thought and Literature is intended for students who plan to teach and write in literature departments or in interdisciplinary programs in the humanities, cultural studies, or humanistic social sciences, or for students intending to formulate cultural policy.

Course work in the program is divided about evenly between advanced courses in literature departments and advanced courses in non-literary departments.

**MASTER OF ARTS**

The Master of Arts is available to students who are admitted to the doctoral program. Students are not admitted into the program for the purpose of earning a terminal M.A. degree. Candidates for the Ph.D., who satisfy the committee of their progress and satisfactorily complete 45 units of course work forming a coherent program of study, may apply for an A.M. in Modern Thought and Literature.
DOCTOR OF PHILOSOPHY

A candidate for the Ph.D. degree in Modern Thought and Literature must complete three years (nine quarters) of full-time work, or the equivalent, in graduate study beyond the A.B. degree. He or she is expected to complete at least 18 courses of graduate work in addition to the dissertation. At least three consecutive quarters of graduate work must be taken at Stanford. Students may spend one year of graduate study abroad.

Requirements for the Ph.D. in Modern Thought and Literature are:

1. An introductory seminar (361), The Modern Tradition (5 units).
2. Nine courses of advanced work in literary studies in one language. Of the nine courses, at least six must be regularly scheduled courses in literary studies focused on the period from 1750 to the present, of which at least two must be regularly scheduled seminars. Courses in the teaching of composition (English 396, 397), ad hoc graduate seminars (395), research courses (398), and thesis registration (802) may not be counted among these six courses. 396, 397, 399, 802 may not be counted toward these requirements under any circumstances.
3. Eight courses of advanced work in non-literature departments, the core of which is completion of either a departmental minor or an interdepartmental concentration, typically consisting of six courses. Department minors are available from the departments of Anthropology, Art, Communication, History, Philosophy, Political Science, Religious Studies, and Sociology (see information in those sections of this bulletin). Approved interdepartmental concentrations have been established in popular culture, ethnic studies, feminist and gender studies, and science and technology studies (specific course requirements are available from the program office). Individually designed concentrations may be approved by petition to the director. In addition to the required six courses in a minor or a concentration, two additional courses from non-literature departments are chosen in consultation with each student’s academic advisor. Course restrictions noted above in item 2 also apply.
4. Qualifying Paper: by the end of the first year, the student must submit a 25-30 page paper based on a term paper written during the first year, or organize a colloquium developed from work done in a seminar. Either the paper or the colloquium must be completed at least two weeks before the end of Spring Quarter.
5. Teaching, an essential part of the program, is normally undertaken in conjunction with the Department of English. Candidates are required to demonstrate competence in teaching.
6. Students must demonstrate, by the end of the third quarter of the first year, a reading knowledge of one foreign language and, by the beginning of the first quarter of the third year, a reading knowledge of one other foreign language. Reading knowledge means the ability to make a genuine scholarly use of the language: that is, to read prose of ordinary difficulty.

Students may not take the University oral examination before completion of the foreign language requirement.

7. Candidacy: at the end of the second year, students apply for candidacy. The following qualifications are required before candidacy can be certified: the earlier submission of a satisfactory qualifying paper, demonstration of a reading knowledge of one foreign language; satisfactory progress in course work; a list of courses applicable to the degree, distinguishing between courses appropriate to the literary component from courses appropriate to the interdisciplinary component; and the submission of a statement outlining the scope and coherence of the interdisciplinary component of the program in relation to the literary component and noting the relevance of the course work to that program.
8. Annual Review: the program and progress of each student must be approved by the Committee-in-Charge at the end of each academic year.
9. University Oral Examination: this examination, covering the student’s areas of concentration, normally is taken in the third year of graduate study. It is a two-hour oral examination administered by four faculty members specializing in the student’s areas of concentration, and a chair from another department. The exam is based on a substantial reading list prepared by the student in conjunction with the faculty committee and designed to cover the areas of expertise pertinent to the student’s dissertation project.
10. Colloquium on the Dissertation Proposal: several weeks after the University oral examination, or in conjunction with that examination, the dissertation committee assembles for up to one hour to discuss the dissertation proposal with the student. Prior to this meeting, the student should have consulted each member of the committee to discuss the proposal and compile a bibliography.
11. Dissertation: the fourth year is devoted to the dissertation, which should be a substantial and original contribution acceptable to the Committee on Modern Thought and Literature. The subject is drawn from the literature of specialization and the area of nonliterary studies.
HUMANITIES

The program participates in the Graduate Program in Humanities leading to a joint Ph.D. degree in Modern Thought and Literature, and Humanities. For a description of the Humanities program, see “Humanities Special Programs” section of this bulletin.

COURSES

The courses listed below are specifically sponsored by the Program in Modern Thought and Literature or are required for the doctoral program. For literature courses, students should consult the listings of the various literature departments at Stanford. For other offerings, students should consult listings in the individual departments of interest. Consent of instructor is often required.

Students in the doctoral program in Modern Thought and Literature are advised to read through the offerings in the Department of English (or in their foreign literature of choice) as well as offerings of the non-literature departments in which they wish to concentrate: for example, courses dealing with culture listed under Anthropology, courses dealing with film under Communication, courses in intellectual and cultural history under History. If the area of nonliterary interest is thematic rather than disciplinary, doctoral students should look under various program listings, such as Feminist Studies, African and Afro-American Studies, or Comparative Studies in Race and Ethnicity.

1401. Women and Welfare—(Enroll in Feminist Studies 140L.)
5 units, Spr (Kuduk)

175. Individual Work—Directed reading or research for undergraduates. Individual work does not count towards unit requirements for undergraduate Humanities majors with a concentration in Modern Thought and Literature. Prerequisite: consent of instructor.
2-5 units, any quarter (Staff)

191. Topics in American Comic Performance: Laughter about Identity, Class, Race, and Gender from Royall Tyler to Richard Pryor—How American performance (theater, stand-up, film, and video) engages questions of identity, class, race, and gender through comedy. How do the conflicts of American social, economic, and cultural life transform themselves into laughter? What are the unique characteristics of American popular comedy? How can we apply semiotic techniques to understand the subversive qualities of laughter?
5 units, Win (Obenzinger)

192. Human Technology Relations in the late 20th Century—Seminar. From cyberspace to cyborgs, from genetic engineering to cosmetic surgery, cultures are struggling to understand evolving relationships between humans and our technologies. What it means to be human, the boundaries between the human and the technological, and how to conduct ourselves in relation to each other and our world are questions asked as a result of changing human-technology interactions. The ways in which our representations of technologies are implicated in changing ideas of the self. Subject positions: the citizen, the addict; the consumer; female; and male. The modes of representation: science fiction, visual images, the designed qualities of technologies, and a set of structuring concepts (the sublime, addiction, fetishism, eroticism, and gender).
5 units, Spr (Weinstein)

213. Family Dynamics in Literature—(Same as Psychiatry 213.) Psychological principles are applied to textual analysis; character interpretations exemplify group dynamics. Authors: Freud, Shakespeare, Kafka, Waugh, D. M. Thomas.
3 units, Spr (Van Natta)

240/340. Lesbian Communities and Identities—(Enroll in Feminist Studies 240/340.)
5 units, Spr (Krieger)

361. Graduate Colloquium: The Modern Tradition—Capitalism, Imperialism, and their Critics—(Enroll in History 306A.) The tradition of social theory beginning with Marx’s concept of capitalism and Lenin’s theory of imperialism is elaborated by examining works arguing that gender and racial hierarchies are constitutive of capitalism. The dimensions of ideological and cultural domination, using the writings of Marx, Gramsci, and representatives of the cultural studies and subaltern studies schools including Start Hall, Gyan Prakash, Edward Said, and Paul Gilroy. The debate over postmodernism/late capitalism, and theory and strategy after the Gulf War.
4-5 units, Aut (Beinin)

395. Ad Hoc Graduate Seminars—Graduate students (three or more) who wish to study a subject or an area not covered by regular courses and seminars may plan an informal seminar and approach a suitable member of the faculty to supervise it.
any quarter

396L. Laboratory in Pedagogy—(Enroll in English 396L.) Required for first-year Ph.D. students in English, Modern Thought and Literature, and Comparative Literature (except for Comparative Literature students doing their teaching in a foreign language). Preparation for TA in undergraduate literature courses. Focus is on leading discussions and grading papers.
2 units, Aut (Cormack, Rebholz)

397A. Teachers Workshop I—(Enroll in English 397A.) Seminar and apprenticeship required for second-year graduate students in English, Modern Thought and Literature, and Comparative Literature teaching in the Writing and Critical Think-
ing program. Each student is assigned as an apprentice to an experienced teacher and sits in on classes, conferences, and tutorials, with eventual responsibility for conducting a class, grading papers, and holding conferences. Meetings discuss rhetoric, theories of composition, and the teaching of writing. Readings in rhetoric and pedagogy. Each student designs a two-quarter syllabus in preparation for teaching English 1 and 2.

1-5 units, Aut (Reichard, Rebholz)

397B. Teachers Workshop II— (Enroll in English 397B.) Seminar for second-year graduate students teaching the first quarter of composition in the Writing and Critical Thinking Program. Focus is on the students’ concurrent teaching and preparation for teaching the second quarter of the sequence.

1-5 units, Win (Reichard, Rebholz)

397C. Teaching Workshop III— (Enroll in English 397C.) See 397B.

1-5 units, Spr (Reichard, Rebholz)

398. Research Courses— Students pursue a special subject of investigation under supervision of a member of the committee or another faculty member. Thesis work is not to be registered under this number.

any quarter

AFFILIATED DEPARTMENT OFFERINGS

The following courses, offered in 1997-98 by faculty on the Committee in Charge of Modern Thought and Literature, may be of interest to students in the program. Course descriptions can be found in the sponsoring department’s section of the Stanford Bulletin. This is not by any means an inclusive list of courses that can be applied to the undergraduate or graduate programs in Modern Thought and Literature. The list is merely intended to provide information about the breadth of interest of faculty who are on the Committee in Charge, thereby showing the interdisciplinary nature of the program.

ANTHROPOLOGY

243. Culture as Commodity (Ebron)

257. Law and Culture (Collier)

291. History of Anthropology Theory: 20th Century (Collier)

COMMUNICATION

125/225. Perspectives on American Journalism (Glasser)

131/231. Media Ethics and Responsibility (Glasser)

133/233. Communication and Culture (Glasser)

COMPARATIVE LITERATURE

168. Introduction to Asian American Culture (Palumbo-Liu)


204Q. Stanford Introductory Seminar: Ethnicity and Literature (Palumbo-Liu)

273. The Postmodern Pacific (Palumbo-Liu)

ENGLISH

74N. Stanford Introductory Seminar: Chicano Culture (Romero)

163C. Chicano Writers (Romero)

308J. Colloquium: New World Borders (Romero)

HISTORY

5. Potter House Seminar on International Affairs: International Perspectives on Gender and Sexuality in Film (Beinin)

144/244. Britain, 1688-1832 (Stansky)

187B. The Middle East in the 20th Century (Beinin)

187C. Women in the Modern Middle East (Beinin, Reynolds)

242S. Undergraduate Research Seminar: Exploring Modern Britain through Documents and Images Held at Stanford (Stansky)

286/386. Undergraduate/Graduate Colloquium: Economic and Social History of the Modern Middle East (Beinin)

288/388. Undergraduate/Graduate Colloquium: Palestine and the Arab-Israeli Conflict (Beinin)

344A. Graduate Colloquium: Problems in Modern British History (Stansky)

445. Graduate Seminar: Modern Britain (Stansky)

PHILOSOPHY

177. Philosophical Issues Concerning Race and Racism (Satz)
270. Core Seminar in Moral Philosophy  
(Satz)

POLITICAL SCIENCE
151A/251A. History of Political Thought I: Ancient, Classical, and Christian Worlds  
(Hansot)

153. Seminar: Utopian Political Thought  
(Hansot)

SPANISH
161. Spanish American Literature II  
(Fox)

169E. Cultural Dimensions of Globalization  
(Fox)

298. Senior Seminar: Panamerican Movement  
(Fox)

363. Third Cinema and After  
(Fox)

MUSIC

Emeriti: (Professors) John M. Chowning, William L. Crosten, George Houle, Wolfgang E. Kuhn, William H. Ramsey, Leonard G. Ratner, Sandor Salgo, Leland C. Smith; (Professors, Performance) Arthur P. Barnes, Marie Gibson, Andor Toth; (Senior Lecturer) Naomi Sparrow; (Lecturers) Frances Blaisdell, Edward C. Colby

Chair: Stephen Hinton

Professors: Karol Berger (on leave, 1997-98), Albert Cohen (on leave Spring), Jonathan Harvey (on leave Autumn)


Assistant Professors: Heather Hadlock, Melissa M. S. Hui (on leave, 1997-98), Stephen Sano, David Soley

Professor (Research): Max V. Mathews

Associate Professors (Performance): George Barth (Piano), Karla Lemon (Director of Orchestras)

Senior Lecturers: Susan Freier* (Violin), Stephen Harrison* (Violoncello), Gennady Kleiman (Violin, Viola), Jennifer Lane (Voice), Phillip Levy* (Violin), Benjamin Simon* (Viola), Gregory A. Wait (Voice), Frederick R. Weldy (Piano)

Lecturers: Giancarlo Aquilanti (Theory and Conducting), Fredrick Berry (Jazz Ensemble, Jazz History), Marjorie Chauvel (Harp), Robert Claire (Baroque Flute), Floyd O. Cooley (Trumpet), John Dornenburg (Viola da Gamba), Gregory Dufford (Clarinet), Michael Edwards (Theory), Charles A. Ferguson (Guitar), Claire Giovannetti (Voice), Joyce Johnson-Hamilton (Trumpet), Elizabeth Harrison (Organ), Andrea Hawley (Flute), Jay Kadis (Audio Recording), McDowell Kenley (Trombone), Daniel Levitin (Recording), Janet Maestre (Flute), Anthony Martin (Baroque Violin), James Matheson (Oboe), Melinda McGee (Arts Management), Herbert Myers (Early Winds), James O. Nadel (Jazz), Kären Nagy (Bibliography), Rufus Olivier (Bassoon), Larry S. Ragent (French Horn), Thomas Schultz (Piano), Malcolm Slaney (Computer Music), Harold Stein (Saxophone), Elaine Thornburgh (Harpischord), Stephen Tramontozzi (Contrabass), Mark Veregge (Percussion), Timothy Zerlang (Piano)

Consulting Professors: Walter Hewlett (CCARH), Eleanor Selfridge-Field (CCARH)

Visiting Professor (emeritus): John R. Pierce

Fellow: Robert McMichael

Acting Instructor: Russell Rodriguez (Mariachi ensemble),

* Member of Stanford String Quartet (Ensemble-in-Residence)

The Department of Music's aims are to provide specialized training for those who plan careers in music as composers, performers, teachers, and research scholars; and to promote the understanding and enjoyment of music in the University at large.

Varied opportunities for instrumental and vocal study and performance are available to majors and nonmajors alike. Students wishing to obtain individual instruction, to participate in chamber music, or to play in department ensembles should note that auditions are held during registration week in Autumn Quarter; while there may be openings in some private studios for qualified students during other quarters, it is to the student's advantage to audition in autumn.

The department is housed in Braun Music Center, Dinkelspiel Auditorium, and The Knoll, including two theaters for concert and recital productions, two rehearsal halls, and a small chamber hall. Pianos, organs, harpsichords, and a variety of early stringed and wind instruments are available for student use. In addition, advanced students may use fine old stringed instruments and bows from the Harry R. Lange Historical Collection.

The Music Library contains a comprehensive collection of complete editions, scores, books, and recordings. Supplementing this is the Stanford Memorial Library of Music, an invaluable collection of musical manuscripts and first editions, and the Archive of Recorded Sound.


The Doreen B. Townsend Center for Computer Research in Music and Acoustics (CCRMA) pro-
vides one of the top-rated facilities for digital sound research in the world. It includes a large distributed computing facility, recording, and editing studio; MIDI-based small systems studios; and work areas with audio-related peripherals. CCRMA software consists of a vast set of programs and system tools for editing, viewing, synthesizing, and analyzing sound. For a detailed and up-to-date description of the hardware and software available, contact the CCRMA office, or see their home page (http://ccrma-www.stanford.edu).

The Center for Computer-Assisted Research in the Humanities (CCARH) houses research focused on constructing computer databases for music and on creating programs that allow student and staff researchers to access, analyze, print, and electronically perform the music.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The undergraduate major in Music is built around a series of foundation courses in theory, musicianship, and music history, in addition to performance and proficiency requirements outlined below. Because of the sequence of courses, it takes more than two years to complete the requirements for the major. Prospective majors are urged to consult one of the major advisers in the department as early as possible in order to plan a program which allows sufficient time for major course work, practice, and University requirements outside the major. Early planning is especially important for students wishing to double-major, for those contemplating overseas study during their undergraduate years, and for those with particular musical talents and interests.

1. Students are required to include the following music foundation courses in their programs:
   a) Theory: 21, 22, 23
   b) History: 40, 41, and three from the series 140-145
   c) Analysis: 121 and two from 122A,B,C

2. Additionally, music majors must fulfill the following two performance requirements:
   a) Individual studies in performance: five quarters
   b) Ensemble: five quarters of work in one or more of the department’s organizations or chamber groups. 161C (Sports Activity Band) does not satisfy this requirement.

3. Majors are required to pass a Piano Proficiency examination as a prerequisite for all higher-level theory and analysis courses (Music 121, 122A,B,C) and the 140 series. Offered at the end of the Autumn and Spring Quarters, it consists of scales and arpeggios, performance of a simple tune (to be set by the examiner), sight reading, and the performance of prepared pieces (consult the Music office for details). Remedial skills are taught in Music 12A,B,C.

4. Majors must also pass an Ear Training Proficiency examination, which is part of the requirements to complete Music 23 or can be taken by arrangement, demonstrating a student’s ability to hear music accurately and to perform it at sight. The successful completion of the examination is a prerequisite for all higher-level theory and analysis courses (Music 121, 122A,B,C).

RECOMMENDED SCHEDULE FOR THE MUSIC MAJOR

The following sample schedule shows how a student may include substantial work on a major in music while also fulfilling the University General Education Requirements during the freshman and sophomore years. The schedule also includes foreign language study, which is strongly recommended for all music majors and especially for those expecting to continue into graduate work in any area of music.

**FIRST YEAR**

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<thead>
<tr>
<th>Courses</th>
<th>A</th>
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<tbody>
<tr>
<td>Freshman English</td>
<td>3</td>
<td>3</td>
<td></td>
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<tr>
<td>Music 19 (if needed), 21, 22</td>
<td>(3)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Individual Instruction and/or Ensemble</td>
<td>1-4</td>
<td>1-4</td>
<td>1-4</td>
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<tr>
<td>Introduction to the Humanities</td>
<td>3-5</td>
<td>3-5</td>
<td>3-5</td>
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<tr>
<td>Choice of Foreign Language, General Education Requirement, or Stanford Introductory Seminar</td>
<td>3-5</td>
<td>3-5</td>
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**SECOND YEAR**

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<tr>
<th>Courses</th>
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<tr>
<td>Music 23, 40, 41, and 121</td>
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<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Individual Instruction and/or Ensemble</td>
<td>1-4</td>
<td>1-4</td>
<td>1-4</td>
</tr>
<tr>
<td>General Education Requirement, or Stanford Introductory Seminar</td>
<td>3-5</td>
<td>3-5</td>
<td>3-5</td>
</tr>
<tr>
<td>Elective</td>
<td>3-5</td>
<td>(3)</td>
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**THIRD AND FOURTH YEARS**

Three from Music 140-145 and two from 122A, B, or C | 4-8 | 4-8 | 4-8 |

Elective | (4) | (4) | (4) |

**MUSIC, SCIENCE, AND TECHNOLOGY**

The specialization in Music, Science, and Technology is designed for those students with a strong interest in the musical ramifications of rapidly evolving computer technology and digital audio, and in the acoustic and psychoacoustic foundations of music. The program entails a research project under faculty guidance and makes use of the highly multidisciplinary environment at CCRMA. This program can serve as a complementary major to students in the sciences and engineering.

1. Students in the program are required to include the following foundation courses in their studies:
a) Theory: Music 21, 22, 23, 121, 151 (4 units), 220A, B, C, D (4 units each); Physics 14 (or equivalent)

b) History: Music 40, 41; 154

c) Applied: individual studies in performance (two quarters) or Music 192A, B; and Ensemble or 192C (five quarters)

2. Students in Music, Science, and Technology must also pass the Piano and Ear-training Proficiency examinations required of Music majors.

MINORS

Minors in Music and in the Music, Science, and Technology specialization provide the student with a core of essential music courses in the disciplines which establish both a foundation for informed appreciation of music and a basis for more advanced study, should the student wish to pursue it.

MUSIC

Course No. and Subject Units
21, 22, 23. Elements of Music 12
40, 41. Music-History Survey 8
Choice of one (writing-intensive courses):
140-145. Studies in Music History 4
Two quarters:
158-171. Ensemble 2
172-177. Individual Instruction 6
Academic Elective in Music 4
Total 36

MUSIC, SCIENCE, AND TECHNOLOGY

Course No. and Subject Units
21, 22, 23. Elements of Music 12
151. Psychophysics and Cognitive Psychology 4
for Musicians
154. History of Electroacoustic Music 4
220A. Fundamentals of Computer-Generated Sound 4
Two quarters:
192A, B. Theory and Practice of Audio Recording 6
192C. Session Recording 2
Academic Elective in Computer Music 4
Total 36

CONCENTRATIONS

Concentrations are offered in performance, conducting, composition, or history and theory. In each concentration, six additional course units in music beyond the basic requirements for the major are required. In addition, each concentrator registers for an independent project (4 units) in the senior year under faculty supervision, leading to a senior recital, a composition, or a senior research paper. Specific guidelines and information on the concentration tracks are available from the Department of Music office.

HONORS PROGRAM

Honors in music is awarded by the faculty to concentrators who have produced an independent project of exceptional quality and meet certain department standards in musicianship, scholarship, and academic standing. The conferral of honors is done solely through faculty consultation. Students do not petition for honors.

GRADUATE PROGRAMS

The following statements apply to all the graduate degrees described below, unless otherwise indicated.

Admission—Applicants should arrange to take the Graduate Record Examination (GRE) well in advance of the January 1 application deadline. Students, except those applying for the A.M. in Music, Science, and Technology, are also required to submit a department entrance test in theory and musicianship, which is sent along with the application, and to submit evidence of accomplishment (scores, tapes, and/or research papers, according to the proposed field of concentration) when they return the application form. All components of the application are due by January 1.

Department Examinations—(1) A placement examination testing the student in theory (counterpoint, harmony, and analysis) and the history of Western music, and (2) a proficiency examination in sight-singing and piano sight-reading given at the beginning of study in the department (usually the week before school begins).

None of Stanford’s required undergraduate courses may be credited toward an advanced degree unless specifically required for both degrees. Only work that receives a grade point average (GPA) of ‘A,’ ‘B,’ or ‘Satisfactory’ in music courses taken as a graduate student is recognized as fulfilling the advanced-degree requirements. Students may need to devote more than the minimum time in residence if preparation for graduate study is inadequate.

MASTER OF ARTS

Residence—A minimum of three quarters of full-time study (considered to be 12 units per quarter in the Department of Music) in residence is required.

MUSIC

Foreign-Language Requirement—Reading knowledge of a language other than English, and the ability to translate into idiomatic English, must be demonstrated at the beginning of graduate study.

Study Program—Students may concentrate in composition, history, or performance practice. To be recommended for the A.M. degree, a candidate must complete a program of 36 units of graduate
course work. Depending on the concentration, the A.M. project will be an investigative essay, a composition, or a demonstration of performance supported by a written commentary on the performance practice involved.

Required are:

Course No. and Subject  
Units
200. Graduate Proseminar  
4
Three quarters of work in the student's area of concentration  
9-12
Three quarters of ensemble performance  
3
299. Master of Arts Project  
4
323. Composition Seminar  
4
or 269A. Performance Practices  
4

Students in the doctoral program may, upon completion of the above requirements and the doctoral qualifying examination, be recommended for the A.M. degree. The A.M. project is not required of these students.

MUSIC, SCIENCE, AND TECHNOLOGY

This is a one-year program of 36 units focusing on the integration of music perception, music-related signal processing and controllers, and synthesis. The program is designed for students having an undergraduate engineering or science degree or a degree that includes course work in engineering mathematics.

Required are:

Course No. and Subject  
Units
120. Introduction to Music Composition and Programming using MIDI-Based Systems  
4
151. Psychophysics and Cognitive Psychology for Musicians  
4
154. History of Electroacoustic Music  
4
192A. Foundations of Sound-Recording Technology  
3
192B. Advanced Sound-Recording Technology  
3
220A. Fundamentals of Computer-Generated Sound  
4
220B. Compositional Algorithms, Psychoacoustics, and Spatial Processing  
4
220C. Seminar in Computer-Music Research  
4
320. Introduction to Digital Audio Signal Processing and the Discrete Fourier Transform  
2
420. Applications of the Fast Fourier Transform  
2
421. Signal Processing Methods in Musical Acoustics  
2

DOCTORAL PROGRAMS

Residence—The candidate must complete a minimum of three years of full-time (12 units or more per quarter) work, some of which is planned individually, for each concentration (see the “Residency” heading under the “Graduate Degrees” section of this bulletin). Doctoral candidates working on Ph.D. dissertations or D.M.A. final projects that require consultation with faculty members continue enrollment in the University under Terminal Graduate Registration (TGR) after they have reached the required residency units.

Foreign Language Requirement—At the beginning of graduate study, all D.M.A. and Ph.D. students in the Computer-Based Theory and Acoustics program are required to demonstrate a reading knowledge of a language other than English and the ability to translate into idiomatic English. Ph.D. candidates in musicology are required to demonstrate proficiency in German and a similar competence in a second language, chosen from French, Italian, or Latin, before the beginning of the second year of doctoral study.

Qualifying Examination—A written and oral examination for admission to candidacy is given just prior to the fourth quarter of full-time residence. This exam tests knowledge of history, repertory, and analysis.

Teaching—All students in the Ph.D. or D.M.A. degree programs, regardless of sources of financial support, are required to complete six quarters of supervised teaching at half time.

Basic Requirements—Doctoral programs in the Department of Music do not require the A.M. degree as a prerequisite. Students entering with only a bachelor's degree are required to take the following course required of all entering students in musicology, regardless of degree level:

Course No. and Subject  
Units
200. Graduate Proseminar  
4

All doctoral candidates must take:

301A,B,C. Music Analysis: Modal, Tonal, and Post-Tonal  
12

DOCTOR OF MUSICAL ARTS IN COMPOSITION

The Doctor of Musical Arts (D.M.A.) degree in Composition is given breadth through collateral studies in other branches of music and in relevant studies outside music as seems desirable. A minimum of 72 units of credit is required for the degree.

Examinations—A written examination in the candidate's special area of concentration is given no later than the seventh quarter after passing the qualifying examination. A public lecture-demonstration is given during the last quarter of residence. It should be one hour in length, treating aspects of the final project.

Candidates are expected to produce a number of works demonstrating their ability to compose in a variety of forms and for the common media: vocal, instrumental, and electronic music. If possible, the works submitted are presented in public performance prepared by the composer. Annual progress is reviewed by the composition faculty. The final project in composition is an extended work for instruments, voices, electronic media, or a combination of these. Music 323, Doctoral Seminar in Composition (16 units) is a required course.
DOCTOR OF PHILOSOPHY

General University regulations for the Ph.D. are discussed in the "Graduate Degrees" section of this bulletin. The Ph.D. in Music can be pursued in two concentrations: Musicology or Computer-Based Music Theory and Acoustics.

Examinations—

1. A written and oral examination testing knowledge of music and research in the area of special concentration is given no later than the seventh quarter after passing the qualifying examination. This includes an oral defense of the dissertation proposal. The examining committee comprises prospective readers of the dissertation.

2. The University oral examination, taken once the dissertation is substantially underway, is an oral presentation and defense of dissertation research methods and results.

Music 221A and B, History of Music Theory (8 units), is a required course for both concentrations. Requirements by concentration are:

MUSICOLOGY

- 269A. Seminar in Performance Practices (4 units)
- 300A,B. History of Notation (8 units)
- 310. Research Seminars in Musicology (16 units)
- 312A,B. Aesthetics and Criticism of Music (8 units)

COMPUTER-BASED MUSIC THEORY AND ACOUSTICS

- 220A,B,C. Computer-Generated Music Seminars (12 units)
- 220D. Research in Computer Music (12 units)
- 320. The Discrete Fourier Transform (4 units)

JOINT Ph.D IN MUSIC AND HUMANITIES

The department participates in the Graduate Program in Humanities leading to a joint Ph.D. degree in Music and Humanities. For a description of the program, see the "Humanities Special Program" section of this bulletin.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

(AU) indicates that the course is subject to the University Activity Unit limitations (8 units maximum).

Many Department of Music courses have pages on the World Wide Web, which are linked to the Music Department home page (see above). Courses with Web pages at press time are noted in their entries below.

GENERAL

1. Introduction to Music—Techniques of active listening for an enhanced understanding of various musical styles. Awareness of the basic elements of music is applied to the appreciation of Western art music from the Middle Ages to the present, and to traditions of popular and non-Western music. Questions of musical form, style, expression, and meaning in different historical and cultural contexts. GER:3a (DR:7)
   3 units, Win (Staff)

1B. Talk about Music: Identity, Meaning, Practice—Some assumptions and discourses surrounding music in the West. The different kinds of meanings and relationships music has to life and culture. Different disciplines for studying music; how they emerged. How we use music, how it relates to our identity and everyday lives, how we account for musical tastes and preference, what sorts of politics emerge from these distinctions.
   3 units, Spr (McMichael)

2A. The Symphony—Symphonic literature 1750 to the present, emphasizing developing skills in critical listening. GER:3a (DR:7)
   3 units, Win (Grey)

2B. The Concerto
   3 units, not given 1997-98

2C. Opera—See Web site.
   3 units, not given 1997-98

3C. Medieval Music
   3 units, not given 1997-98

3F. Franz Liszt and the Music of the Romantic Era
   3 units, not given 1997-98

4A. The Music of J. S. Bach
   3 units, not given 1997-98

4B. The Music of Mozart
   3 units, not given 1997-98

4C. The Music of Beethoven
   3 units, not given 1997-98

4D. The Operas of Mozart
   3 units, not given 1997-98

4E. The Music of Debussy and Ravel
   3 units, not given 1997-98

4F. The Music of Stravinsky
   3 units, not given 1997-98

4G. The Operas of Richard Wagner
   3 units, not given 1997-98

5A. Music in America—Development of popular, folk, and art music in America from the Pilgrims to the present. See Web site. GER:3a (DR:7)
   3 units, Spr (Hadlock)

7B. Explorations in World Music
   3 units, not given 1997-98

14,15,16,17. Stanford Introductory Seminars
- 14N. Stanford Introductory Seminar: Women Making Music—Preference to freshmen. Women's musical activities as composers, performers, and patrons. Women's music in traditional cultures, such as Finnish and Greek laments; composers of Western art music from
Hildegard von Bingen in the Middle Ages to Libby Larsen in the present; the "mystique" of performers from cloistered nuns to operatic divas like Maria Callas; self-made women in pop music from Bessie Smith to Madonna. GER:3a,4c (DR:7f)

3 units, Aut (Hadlock)


4 units, Win (Chaife)

15N. Stanford Introductory Seminar: The Role of Technology in the Arts—Preference to freshmen. The history and theory of cinema in comparison to electronic music, looking at the changing roles of composer/performer/audience, and investigating the effect of recording on the art and industry of music. GER:3a (DR:7)

3 units, Spr (J. Berger)

15Q. Stanford Introductory Seminar: Opera on Film—Preference to sophomores. How filmmakers have reimagined and reinvented the look and sound of opera. Comparison of filmic manipulations of time, space, and sound to earlier audio-visual "technologies" such as echoes, off-stage music, multiple orchestras; gods descending in stage-machines; on-stage floods, volcanic eruptions, and tempests. Film versions of Mozart’s Magic Flute, Don Giovanni; Cecil B. DeMill’s silent film of Bizet’s Carmen (1915); Preminger’s Carmen Jones (1954), dubbing voices of white singers for certain members of the all-black cast; visual and vocal gender-bending in Syberberg’s filmed Parsifal (1982); the "morphed" castrato voice in Farinelli (1994); and Nixon in China, an opera composed for television. GER:3a (DR:7)

3 units, Spr (Hadlock)

16N. Stanford Introductory Seminar: Richard Wagner and the Ring of the Nibelungen—Preference to freshmen. Introduction to the four "music dramas" that make up Wagner’s Ring cycle. Their mythical and literary sources, the role of music (and "leitmotif") in projecting the structure and meaning of the drama, and their influence on musicians and other artists. Interpretations of the Ring from sociopolitical, psychoanalytic, religious, and other perspectives. Selected critical readings, recordings, and videotapes of recent productions are a basis for discussion of musical, historical, and interpretive issues. Recommended: some ability to read music. GER:3a (DR:7)

3 units, Spr (Grey)

16Q. Stanford Introductory Seminar: Ki ho’alu: The New Renaissance of Hawaiian Musical Tradition—Preference to sophomores. The Hawaiian tradition of Slack-Key Guitar, Hawaiian history and culture surrounding its development, and subsequent evolution. Hands-on experience, reading, discussion, and workshops. Recommended: guitar-playing abilities. GER:3a,4b (DR:3 or 7)

3 units, Aut (Sano)

17Q. Stanford Introductory Dialogue: Kurt Weill and the Musical Theater—Preference to sophomores. Weill saw his mission as a composer to reform musical theater, e.g., as the composer of The Threepenny Opera, a satirical reworking of The Beggar’s Opera. His experiments on Broadway were no less revolutionary or daring, although he incurred the scorn of his German colleagues for having “sold out” to commercial theater. Students participate in a re-evaluation of his impact and influence.

2 units, Spr (Hinton)

18. Jazz History

18A. Ragtime to Bebop (1900-1940)

3 units, not given 1997-98

18B. Bebop to Present (1940-)—Modern jazz styles from Bebop to 1940. Emphasis is on the significant artists of each style.

3 units, Aut (Berry)

19. Introduction to Music Theory—For non-music majors and music majors or minors unable to pass proficiency test for entry to 21. Fundamentals of music notation, basic sight reading, sight singing, ear training, keyboard harmony; melodic, rhythmic, and harmonic dictation. Skill oriented, using piano and voice as basic tools to develop listening and reading skills. In the Autumn, one section is in French. See Web site. GER:3a (DR:7)

3 units, Aut (Aquilanti)

Spr (Staff)

20A. Jazz Theory—Introduces the language and sounds of jazz through listening, analysis, and compositional exercises. Students apply the fundamentals of Western music theory to the study of jazz. Prerequisite: 19 or consent of instructor.

3 units, Win (Nadel)

20B. Advanced Jazz Theory

3 units, not given 1997-98

20C. Jazz Arranging and Composition

3 units, not given 1997-98

111. Seminar in North American Taiko—The musical, cultural, historical, and political perspectives of taiko through drumming, readings, class discussion, workshops, and original research. Jap-
Japanese music and Japanese American history: relations between performance, cultural expression, community, and identity. GER:3a,4b (DR:7 or 3)

4 units, Spr (Sano, Staff)

118A. Afro-Cuban Music—The evolution of popular and folkloric styles, focusing mainly on Cuban music and parallel development and cross-influences with African American music. Through listening, performance, and analysis of classic and contemporary works, students examine important rhythmic and harmonic developments in arranging and orchestration. Visiting artists from the Bay Area Latin-music community etc. Music styles represented include Afro-Puerto Rican, Afro-Venezuelan, Columbian, Brazilian, jazz, and New Orleans early music.

3 units, Spr (Nadel)

118B. The Struggle Continues: Jazz, Culture, and Society—Seminar on how the struggles in and over jazz reflect historically specific social, political, and cultural changes in black and dominant cultures. Interdisciplinary method, using oral histories; jazz histories and criticism; sociological pieces; autobiographies; theoretical material on race, class, gender, sexuality, and popular culture; sound recordings; and videos.

3 units, Win (McMichael)

187. The Work of Art and the Creation of Mind—(Enroll in Education 200X.)

3 units, Win (Elser, Hannah, Rehm, Ross, Sano)

191. Arts Management—Managing a career in the arts as a performer, administrator, concert producer, or promoter. Basic principles of arts management, including public relations, concert production, professional presentation, booking, and fund-raising. Applicable to all performing arts.

1 unit, Win (McGee)

280. TA Training Course—For doctoral students serving as Teaching Assistants. Orientation to resources at Stanford, guest presentations on principles of common teaching activities, supervised teaching experience. Students should take this course in the second year, as they begin teaching.

0-1 unit, Aut (Von Hippel)

FOUNDATION FOR A.B. MAJOR

21,22,23. Elements of Music—Melody, harmony, counterpoint, and rhythm studied through analysis, composition, and exercises in practical musicianship. Emphasis is on four-part writing and species counterpoint. Analysis and compositional projects in historical styles. Students with previous training in theory should take a placement exam given at the beginning of each quarter for admission to more advanced courses.

21. Elements of Music I—16th-century counterpoint. Two- and three-part species exercises; analysis of works from the period. Students intending to continue with 22-23 who do not have piano proficiency should begin 12 (class piano) concurrently. Prerequisite: pass proficiency examination in basic musical skills given on first day of class. See Web site. GER:3a (DR:7)

4 units, Aut (Staff)
Win (Aquilanti)

22. Elements of Music II—Introduction to scales, basic elements of melody and rhythm, simple harmony, sight singing, and dictation. Extension of melody and harmony, introduction of simple forms, chorale harmonizations. See Web Site. Prerequisite: 21 or consent of instructor. GER:3a (DR:7)

4 units, Win (Edwards)
Spr (Aquilanti)

23. Elements of Music III—Chromatic harmony, complex forms. Satisfactory passage of ear-training proficiency exam is a requirement for course completion. Passage of piano proficiency exam is strongly recommended at this time to continue in the theory sequence. See Web Site. Prerequisite: 22 or consent of instructor.

4 units, Aut (Staff)
Spr (Edwards)

40,41. Music History—The history of Western art music from Gregorian chant to the present, stressing major styles and genres in their intellectual and institutional settings.

40. Music History to 1750—Prerequisite: 23.

4 units, Win (Hadlock)

41. Music History since 1750—Prerequisite: 40.

4 units, Spr (Hinton)

121. Analysis of Tonal Music—Complete movements or entire shorter works of the 18th and 19th centuries, analyzed in a variety of theoretical approaches. Prerequisites: 23, successful completion of the ear-training and piano-proficiency examinations.

4 units, Win (Edwards)

122A. 18th-Century Counterpoint—Analysis and composition of two- and three-part inventions and three- and four-voice fugues. Use of keyboard, ear training, and sight singing underlies all written work. Prerequisites: 23, successful completion of the ear-training and piano-proficiency examinations.

4 units, Win (Staff)

122B. Harmonic Materials of the 19th Century—Analysis of 19th-century music, with compositional exercises based on 19th-century models. Prerequisites: 121, successful completion of the ear-training and piano-proficiency examinations.

4 units, Spr (Grey)
122C. Introduction to 20th-Century Composition—Projects in free composition based, at first, on 20th-century models analyzed in class. Final projects are performed in an informal setting. Prerequisites: 23, successful completion of the ear-training and piano-proficiency examinations.
3 units, Aut (Soley)

COMPOSITION AND THEORY
120. Introduction to Music Composition and Programming using MIDI Based Systems—Composition projects demonstrate participant’s own software for voicing and controlling MIDI synthesis. Extensive individual lab time required during week days. See Web site. Prerequisite: consent of instructor. GER:3a (DR:7)
4 units, Win (Mathews)

123. Undergraduate Seminar in Composition—Individual projects in creative work. May be repeated for credit. Prerequisite: 23 or consent of instructor.
3 units, Aut (Edwards)
Win, Spr (Soley)

220. Computer-Generated Music
220A. Fundamentals of Computer-Generated Sound—Techniques for digital sound synthesis, effects, and reverberation. Topics: summary of digital synthesis techniques (additive, subtractive, nonlinear, wavetable, spectral-modeling, and physical-modeling); digital effects algorithms (phasing, flanging, chorus, pitch-shifting, and vocoding); and techniques for digital reverberation.
4 units, Win (J. Berger)

220B. Compositional Algorithms, Psychoacoustics, and Spatial Processing—Use of high-level programming language as a compositional aid in creating musical structures. Studies in the physical correlates to auditory perception and review of psychoacoustic literature. Simulation of a reverberant space and control of the position of sound within the space. Prerequisite: 220A.
4 units, Win (Chafe)

220C. Seminar in Computer-Music Research—Individual projects in composition, psychoacoustics, or signal processing. See Web site. Prerequisite: 220B.
4 units, Spr (Chafe)

220D. Research—Independent research projects in composition, psychoacoustics, or signal processing. Prerequisite: 220C.
1-4 units, any quarter (Staff)

HISTORY AND LITERATURE
140, 141, 142, 143, 144, 145. Seminars in Music History—Specialized topics in music history, each offered at least once within any two-year period. Topics vary each year.

140. Studies in Medieval Music—Prerequisite: 40. (WIM)
4 units, Aut (Mahrt)

141. Studies in Renaissance Music—Prerequisite: 40. (WIM)
4 units, given 1998-99

142. Studies in Baroque Music—Prerequisite: 40. (WIM)
4 units, Spr (Staff)

143. Studies in Classic Music—Prerequisite: 41. (WIM)
4 units, given 1998-99

144. Studies in Romantic Music—Prerequisite: 41. (WIM)
4 units, given 1998-99

145. Studies in Modern Music—Prerequisite: 41. (WIM)
4 units, Win (Hinton)

146. Keyboard Fantasias of the 17th and 18th Centuries—For upper-class undergraduates and graduate students. The Fantasia is the paradigmatic genre of free compositional style. Experimental in the 17th and 18th centuries, it was often avant-garde with respect to musical form, harmony, meter, counterpoint, and virtuosity—sometimes notated without bar lines or disseminated as examples of improvisations for other composers, organists, and even amateurs. Performance practice and style history in works by J. S. and C. P. E. Bach, Froberger, Sweelinck, Mozart, and others.
3 units, Spr (Plebuch)

147. Hindemith
3 units, not given 1997-98

148. Shakespeare in 19th-Century Music
3 units, not given 1997-98

149. Instrumental Music with Electronics—For upper-class undergraduates and graduate students. The link between the “traditional” evolution of instrumental, orchestral, and vocal music and the revolutionary world of the electronic studio occurs in works where the two are combined. Focus is on such linking works, from Stockhausen’s contributions to the products of IRCAM (Boulez, Murail), etc. GER:3a (DR:7)
3 units, Win (Harvey)

150A. Gregorian Chant
3 units, not given 1997-98

151. Psychophysics and Cognitive Psychology for Musicians—Basic concepts and experiments relevant to the use of sound, especially synthesized, in music. Introduction to elementary concepts; no previous background assumed. Listening to sound examples important. Emphasis is on salience and importance of various auditory phenomena in music. Prerequisite: some basic knowledge of music. GER:3a (DR:7)
4 units, Win (J. Berger)
154. History of Electroacoustic Music—(WIM)
4 units, not given 1997-98

240,241,242,243,244,245. Seminars in Music History—For graduate students. Topics as in 140-145. Participation in upper-class seminars, with additional in-depth research. Specialized topics in music history, each offered at least once within any two-year period. Topics vary each year.

240. Studies in Medieval Music
4 units, Aut (Mahrt)

242. Studies in Baroque Music
4 units, Spr (Staff)

245. Studies in Modern Music
4 units, Win (Hinton)

PERFORMANCE

GROUP INSTRUCTION

Note—Special fee of $85 per quarter (subject to revision) for 12A,B,C (non-majors); 65A,B, 72, 73, 74, 75, 76, 77.

12A,B,C. Piano Class (Beginning)—(A=level 1; B=level 2; C=level 3) Preference given to music majors.

1 unit, Aut, Win, Spr (Zerlang)

65A,B. Voice Class I, II—Group (7 students to a section) beginning voice for the non-major (65A = level 1; B = level 2).

1 unit, Aut, Win, Spr (Giovannetti)

65C. Voice Class—For music majors, and non-majors who are members of departmental performing organizations.

1 unit, Aut, Win, Spr (Wait)

65D. Jazz Solo-Voice Class

1 unit, not given 1997-98

72,73,74,75,76,77. Small-Group Intermediate-Level Instruction—Minimum enrollment required. May be repeated for credit.

1 unit, Aut, Win, Spr

72A. Piano Class—For intermediate students. Prerequisite: 12C, audition.

(Zerlang)

72B. Organ Class—For beginning organ students who have keyboard skills.

(E. Harrison)

72C. Harpsichord Class—For beginning harpsichord students who have keyboard skills.

(Thornburgh)

73. Voice Class—For intermediate students. Admission by audition.

(Wait)

74A. Stringed Instruments Classes

(S. Harrison, Kleyman)

74C. Classical Guitar Class

(Ferguson)

74D. Harp Class

(Chauvel)

75A. Flute Class

(Staff)

75B. Renaissance Wind Instruments Class

(Myers)

76. Brass Instruments Classes

(Kenley)

77. Percussion Class

(Veregge)

INDIVIDUAL INSTRUCTION

172/272, 173/273, 174/274, 175/275, 176/276, 177/277. Individual Vocal and Instrumental Instruction—Special fee of $165 per quarter for majors and $330 for non-majors (subject to revision). Prospective students must demonstrate, by audition with the appropriate teacher, a minimum proficiency on instrument. Minimum proficiency requirements for each instrument are at department office. 270-level courses are for advanced students. May be repeated for credit.

3 units, Aut, Win, Spr

172/272. Keyboard Instruments

172A/272A. Piano

(Barth, Schultz, Weldy)

172B/272B. Organ

(Harrison)

172C/272C. Harpsichord

(Thornburgh)

172E/272E. Early Piano

(Barnes)

173/273. Voice

(Lane, Wait)

174/274. Stringed Instruments

174A/274A. Violin

(Freier, Kleyman, Levy)

174B/274B. Viola

(Kleyman, Simon)

174C/274C. Violoncello

(S. Harrison)

174D/274D. Contrabass

(Tramontozzi)

174E/274E. Viola da Gamba

(Dornenburg)

174F/274F. Classical Guitar

(Ferguson)

174G/274G. Harp

(Chauvel)

174H/274H. Baroque Violin

(Marin)

174I/274I. Early Plucked Strings

(Staff)

175/275. Woodwind Instruments

175A/275A. Flute

(Blaisted, Hawley, Maestie)

175B/275B. Oboe

(Matheson)

175C/275C. Clarinet

(Dufford)

175D/275D. Bassoon

(Olivier)
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Renaissance Wind Instruments
(Myers)

Saxophone
(Stein)

Baroque Flute
(Claire)

Brass Instruments

French Horn
(Ragent)

Trumpet
(Johnson-Hamilton)

Trombone
(Kenley)

Tuba
(Cooley)

Percussion
(Veregge)

PERFORMANCE PRACTICES

130. Elementary Conducting
130A. Fundamentals of Conducting and Orchestration—Fundamentals of baton techniques and rehearsal procedures; principles and theory of orchestration and score-reading. Prerequisite: 23.
3 units, Aut, Win, Spr (Aquilanti)

130B. Elementary Orchestral Conducting—Techniques specific to the conducting of orchestral ensembles. Prerequisite: 130A.
3 units, Spr (Lemon)

130C. Elementary Choral Conducting—Techniques specific to the conducting of choral ensembles: warm-ups, breathing, balance, blend, choral tone, isolation principles, recitative conducting, preparation, and conducting of choral/orchestral works. Prerequisite: 130A.
3 units, Win (Sano)

1 unit, Aut, Win, Spr (Lane)

230. Advanced Orchestral Conducting—May be repeated for credit. Prerequisite: 130B.
2-4 units, Aut, Win, Spr (Lemon)

231. Advanced Choral Conducting—May be repeated for credit. Prerequisite: 130C.
2-4 units, Aut, Win, Spr (Sano)

270. Graduate Seminar in 20th-Century Performance Practice
4 units, not given 1997-98

ENSEMBLE

An audition is required for admission to any University musical organization; audition schedules are announced during the registration period in the Autumn Quarter. Audition is by appointment in Winter and Spring Quarters: contact the ensemble director. Membership is open to all students including those who do not register for credit, although these courses may be repeated for credit.

157. Introduction to Mariachi Ensemble—Introduction to the practice of mariachi music, tradition, and history. Focus is on learning traditional sones, rancheras, huapangos, and boleros. Requirements: ability to play, and access to instruments—violin, trumpet, guitar, vihuela, and guitarron.
1 unit, Aut, Win, Spr (Staff)

158. Contemporary Performance Ensemble—Alea II. A workshop for performance of works by Stanford and contemporary composers. Rehearsals arranged according to performance requirements. One concert per quarter.
1 unit, Aut, Win, Spr (Lemon)

159. Early Music Singers—Small choir specializing in Medieval, Renaissance, and early Baroque vocal music. One major concert per quarter.
1 unit, Aut, Win, Spr (Mahrt)

160. University Orchestra—70 to 100-member ensemble performing major orchestral works; minimum one concert per quarter.
1 unit, Aut, Win, Spr (Lemon)

161. University Bands
161A. University Symphonic Band—40 to 50-member ensemble performing transcriptions of symphonic, brass band music, and repertoire composed specifically for symphonic band. One concert per quarter.
1 unit, Aut, Win, Spr (Aquilanti)

161B. Jazz Ensemble—Big-band format. Repertoire includes hits from the '30s through the '50s. One concert per quarter.
1 unit, Aut, Win, Spr (Berry)

161C. Sports Activity Bands—Traditional marching skills are not encouraged; commitment to raising spirits and irreverence are. Performs at most sporting events. May be repeated for credit. (AU)
1 unit, Aut, Win, Spr (Staff)

162. Symphonic Chorus—100 to 150-voice ensemble, performing major choral masterworks with orchestra. One concert per quarter.
1 unit, Aut, Win, Spr (Sano)

163. University Choir—Official choir of Memorial Church, which furnishes music for Sunday services and special occasions in the church calendar.
2 units, Aut, Win, Spr (Wait)
165. **Stanford Chamber Chorale**—Select 24-voice chamber ensemble, specializing in virtuoso choral repertoire from all periods of Western classical music.

1 unit, Aut, Win, Spr (Sano)

166. **Chamber Orchestra**—30 to 50-member string orchestra supplemented as needed by winds. Performs chamber repertoire from Baroque to contemporary eras. Open to advanced players who have had orchestral experience. One concert per quarter.

1 units Aut, Win, Spr (Lemon)

167. **University Singers**—Mixed-repertoire chorus, performing a broad variety of choral repertoire from all periods of Western classical music and from other world cultures.

1 unit, Aut, Win, Spr (Sano)

169. **Stanford Taiko**—Select North American taiko ensemble, performing traditional and contemporary repertoire for Japanese drums. Multiple performances in Winter and Spring Quarters, also touring; instrument construction and maintenance.

1 unit, Aut, Win, Spr (Sano)

170. **Piano Accompanying**—Techniques of piano accompanying, focusing on performances in a workshop setting. Open to students at the private-lesson-proficiency level in piano; no previous accompanying experience required.

1 unit, Aut, Win, Spr (Weldy)

171. **Chamber Music**—Open to students at the private-lesson-proficiency level to hone ensemble skills, preferably while also taking private lessons. Small combinations for strings, winds, and keyboard instruments. Admission by audition.

1 unit, Aut, Win, Spr (Staff)

**RECORDING**

192. **Theory and Practice of Audio Recording**

192A. **Foundations of Sound Recording Technology**—Preference given to music majors with MST specialization. Topics: elementary electronics, physics of sound transduction and microphone operation, selection and placement; mixing consoles; connectors and device interconnection; grounding and shielding; principles of analog magnetic recording; operation maintenance of recording equipment; basic principles of recording engineering. Enrollment limited. Prerequisites: 151; algebra, physics basics.

3 units, Aut (Kadis)

192B. **Advanced Sound Recording Technology**—Topics: noise reduction techniques; dynamics and time-delay audio effects; principles of digital audio; disk- and tape-based digital recorders; digital audio workstations and editing; advanced multitrack techniques; SMPTE and MIDI time code and device synchronization. Prerequisite: 192A.

3 units, Win (Kadis)

192C. **Session Recording**—Independent engineering of recording sessions. May be repeated for credit. Prerequisites: 192A, B.

1 unit, Aut, Win, Spr (Kadis)

192E. **Workshop in Arranging Pop/Rock Music**—Discussion, analysis, and hands-on workshop: arranging horn, string, and vocal parts for popular music. Inspiration from contemporary arrangers such as Burt Bacharach, Van Dyke Parks, Stevie Wonder, Prince, Quincy Jones, Richard Carpenter. Core of students' own writing and recording of new arrangements each week, class discussion, and critique in workshop format. Enrollment limited to 10; students admitted by audition and consent of instructors. Prospective students should submit a tape of their arranging abilities during Winter Quarter. Prerequisites: 20A or 21-23, 192A, B, ear-training proficiency exam passed.

1 unit, Spr (Kadis, Levitin)

**DIRECTED READING AND RESEARCH**

198. **Concentrations Project**—For concentration-program participants only. Must be taken in senior year.

4 units, Aut, Win, Spr (Staff)

199. **Independent Study**—For advanced undergraduates and graduate students who wish to do work outside the regular curriculum. Before registering, student must present specific project and enlist a faculty sponsor.

1-4 units, Aut, Win, Spr (Staff)

**GRADUATE RESEARCH AND SPECIAL STUDIES**

200. **Graduate Proseminar**—Required of first-year graduate students in music. Introduction to research in music, bibliographical materials, major issues in the field, philosophy and methods in music history. Guest lecturers and individual research topics.

4 units, Aut (Hadlock, Nagy)

221. **History of Music Theory**—Principal theories, theorists, and treatises of Western music, from ancient times to the present.

221A. **Ancient through Renaissance**

4 units, Aut (Cohen)

221B. **Baroque through Modern**

4 units, Win (Cohen)

252. **Seminar: Topics in Computer Music**—See Web site.

1-3 units, Win (J. Berger)

253. **Musical Information: An Introduction**—The kinds of musical information used in sound,
graphical, and analytical applications. Emphasis is on independent concepts and principles in music representation and research objectives (repertoire analysis, performance analysis, theoretical models, similarity, and stylistic simulation). Examples from Western art music. Prerequisites: one year of music theory or equivalent; "methods" courses in such fields as musical analysis, symbolic systems, information processing, sound engineering, or intellectual-property issues.

4 units, Win (Hewlett)

254. Seminar: Musical Representation and Computer Analysis—Participants explore issues introduced in 253 in greater depth and take initiative for research projects related to a theoretical or methodological issue, a software project, or a significant analytical result. Prerequisite: 253 or consent of instructor.

4 units, Spr (Selfridge-Field)

269A. Seminar in Performance Practices—Performance techniques, theoretical principles, aesthetics, and musical resources of various historical periods.

4 units, Win (Barth)

269B. Research in Performance Practices—Directed reading and research.

4 units, Aut, Win, Spr (Staff)

299. Master of Arts Project

4 units, Aut, Win, Spr (Staff)

300A, B. Seminar in Notation

4 units, given 1998-99


301A. Modal Analysis

4 units, Spr (Mahrt)

301B. Tonal Analysis

4 units, Aut (Barth)

301C. Post-Tonal Analysis

4 units, Win (Soley)

302. Research in Musicology—Directed reading and research.

4 units, Aut, Win, Spr (Staff)

310. Research Seminar in Musicology—Specialized topics vary each year.

4 units, Aut (Grey)

Win (Staff)

Spr (Mahrt)

312. Aesthetics and Criticism of Music

4 units, given 1998-99

319. Research Seminar on Computational Models of Sound Perception

1-3 units, Aut, Win, Spr (Slaney)

320. Introduction to Digital Audio Signal Processing and the Discrete Fourier Transform (DFT)—Introduction to the mathematics of digital signal processing and spectrum analysis for music and audio research. Topics: complex numbers, sinusoids, spectra, aspects of audio perception, the DFT, and basic Fourier time-frequency relationships in the discrete-time case. See Web site.

2-4 units, Aut (Smith)

321. Readings in Music Theory

3 units, Aut, Win, Spr (Staff)

323. Doctoral Seminar in Composition—Illustrated discussions of compositional issues and techniques. Students present their own work to the class, and individually to the instructor.

4 units, Aut (Soley)

Win (Harvey)

Spr (Staff)

325. Individual Graduate Projects in Composition

1-4 units, Aut, Win, Spr (Staff)

341. Ph.D. Dissertation

1-9 units, Aut, Win, Spr (Staff)

399. D.M.A. Final Project

1-9 units, Aut, Win, Spr (Staff)

420. Applications of the Fast Fourier Transform (FFT) in Digital Audio Signal Processing—Spectrum analysis and signal processing using the FFT, with emphasis on audio applications. Topics: FFT windows; cyclic and acyclic convolution; zero padding and other spectrum analysis parameters; FIR filter design; phase and channel vocoders; the overlap-add and filter-bank-summation methods for short-time Fourier analysis, modification, and resynthesis; tracking sinusoidal peaks across FFT frames; modeling time-varying spectra as sinusoids plus filtered noise; FFT-based sound synthesis; brief overviews of and introductions to transform coders (as used in MPEG audio compression), perfect-reconstruction filter banks, and wavelet transforms. See Web site. Prerequisite: Electrical Engineering 261. Recommended: Electrical Engineering 264.

2-4 units, Win (Smith)

421. Signal Processing Methods in Musical Acoustics—Computational models of musical instruments primarily in the wind and string families based on physical models implemented using signal processing methods. The models are designed to capture only the "audible physics" of musical instruments using computationally efficient algorithms. Topics: mass-spring systems and their discrete-time simulation, sampled traveling waves, lumping of losses and dispersion, delay-line interpolation methods, applications of allpass filters and lattice/ladder digital filters in acoustic models, models of winds and strings using delay lines, scattering junctions, digital filters, and nonlinear junctions implementing oscillation sources such as bow-string and reed-bore couplings. See Web
site. Prerequisites: Engineering 15 or equivalent; Electrical Engineering 264.

2-4 units, Spr (Smith)

423. Graduate Seminar in Signal Processing Research—Seminar for graduate students pursuing research in music and audio applications of signal processing. Prerequisite: consent of the instructor.

1-4 units, Aut, Win, Spr (Smith)

OVERSEAS STUDIES PROGRAM

Director of the Program: Russell A. Berman

Stanford Program in Berlin
Director: Karen Kramer
Associate Director: Maria Biege
Faculty: Hildegard Bedarff, Paolo Berdini, Dubravka Friesel-Kopecki, Thomas Hare, Therese Hörmick, Markus Jachtenfuchs, Cord Jakob, Judith Koch, Hans-Peter Krüger, Joachim Luchesi, Franz Neckenig, Sylke Tempel, Joch-en Wohlfel

Stanford Program in Florence
Director: Ermelinda Campani
Faculty: Nicola Bellini, Francesco Benvenuti, Dario Biocca, Roberto D'Alimonte, Avner Greif, Antonello La Vergata, Giuseppe Mammarella, Jeffrey Schnapp, Timothy Verdon

Stanford Center for Technology and Innovation (SCTI)—Kyoto

Kyoto Center for Japanese Studies (KCJS)
Director: Terry MacDougall
Faculty: Shigeyuki Abe, Theodore Bestor, Monica Bethe, Patricia Fister, Toshihiko Fujiwara, Fujiko Hotta, Livia Kohn, Ikuo Kume, Larry Leifer, Takeshi Tamura, Haruka Ueda, Mariko Uemiy, Chihiro Yamaoka

Stanford Program in Moscow
Director: Maxim Bratersky
Associate Director: Alexander Abashkin
Faculty: Tatyana Boldyreva, Jack Kollmann, Nancy Kollmann, Elizaveta Kurganova, Zinaida Kuznetsova, Vladimir Mau, Inna Shiman-skaya, Mikk Titma, Lev Vampolsky, Andrei Zorin

Stanford Program in Oxford
Director: Geoffrey Tyack

Stanford Program in Paris
Director: Estelle Halevi

Faculty: Corinne Balleix, Frédéric Charillon, Isaac Getz, Alexandra Giraud, Odile Grand-Clement, Marie Grée, Ran Halevi, Denis Lacorne, Marc Lazar, Todd Lubart, Michael Martinan, Nonna Mayer, Florence Mercier, Myriam Panard-Hill, Marie-Christine Ricci

Stanford Program in Puebla
Dean of International Affairs, Universidad de las Américas Puebla: Ofelia Cervantes
Faculty: Enrique Cárdenas, Gonzalo Castañeda, Isidro Morales, Patricia Plunket, Robert Shadow

Stanford Program in Santiago
Director: Edmund Fuenzalida
Faculty: Ricardo Ffrench-Davis, Ernesto Hajek, María de la Luz Hurtado, Amaro Menendez, Oscar Muñoz, Hernán Pons, Francisco Rojas, Jorge Ruffinelli, Bernardo Subercaseaux, Torcuato di Tella, Teresa Valdés

Stanford University encourages students to explore the opportunities of study abroad and to achieve cultural literacy through living, learning, and working in another country. Overseas Studies maintains centers in Berlin, Florence, Kyoto, Moscow, Oxford, Paris, Puebla, and Santiago. Students may enroll for one or two quarters at most centers and for three quarters in Berlin, Kyoto-KCJS, and Oxford. Course offerings from engineering, humanities, sciences, and social sciences provide full Stanford credit. Most courses are also reviewed by specific departments and count toward major requirements. Courses that fulfill General Education Requirements in Area 3 or Distribution Requirements in Areas 7 and 9 are usually offered at every center. Academic or paid internships are available at the Berlin, Florence, Kyoto-SCTI, Moscow, and Paris centers. Research opportunities are available in various formats at different centers. Minimum required language preparation varies among centers: Moscow offers a first-year intensive language course for those without prior Russian study; Berlin requires one or two quarters; Kyoto-SCTI requires two quarters for students in technical majors and five quarters for those in non-technical majors; Florence, Paris, and Santiago require one full year; Kyoto-KCJS and Puebla require more advanced language preparations. Depending on language proficiency, students may attend local universities in Berlin, Florence, and Paris.

Students remain registered at Stanford and pay regular tuition, alongside Overseas Studies charges which are based on Stanford room and board rates. Regular financial aid applies, and may be increased to cover additional costs. At most centers, students live in a homestay in the host culture, or with local students.

Overseas Studies, located on the first floor of Sweet Hall, has a full-time staff to assist students in planning their programs abroad. The informa-
the construction of the Egyptian past as it relates to the German present in which that past is "discovered." The Jesuit Athanasius Kircher, orientalism of Hegel, the Prussian Expedition of 1812, and art historian Heinrich Schäfer. Collections are studied in Berlin's Bode Museum and Egyptian Museum in Charlottenberg.

4 units, Aut (Hare)

99. Comparative Cultural Interactions: Japan/America, Germany/America—(Same as Comparative Literature 99.) Focuses on the unusual triangle, Germany/America/Japan. How American occupation interacted with postwar German and Japanese culture to create three national cultures showing striking similarities and irreducible differences. Novels, films, and popular culture. How a consciousness of calamities in recent national history and the conspicuous presence of foreign power and culture have interacted with domestic cultural developments in Germany and Japan from 1945-1985.

3 units, Aut (Hare)

100X. The History of German and European Economic Philosophy—(Same as Economics 100X, History 129V, Political Science 161X.) The intellectual history of a region that had fascist, socialist, communist, and conventional liberal-democratic governments within a single generation. Chronological and systematic review of seven aspects of German political and economic thinking since 1870. Economics majors take 5 units.

GER:3b (DR:8)

4-5 units, Spr (Krüger)

101A. Contemporary Theater—(Same as Drama 101A, German Studies 195.) Texts of plays are supplemented by theoretical writings of the respective playwrights and background reading in theater history and theory. Weekly theater trips, a tour of backstage facilities, attendance at a rehearsal, and discussions with actors, directors, or other theater professionals. GER:3a (DR:7)

4-5 units, Aut (Kramer)

117V. The Industrial Revolution and its Impact on Art, Architecture, and Theory—(Same as Science, Technology, and Society 117V, Art 173Y.) The interlinking of architecture and painting with technological and scientific development. In a period of industrial revolution, the dominance of positivist thinking and empirical methods promotes in the cultural and artistic realm a response of euphoric acceptance or emphatic rejection. Art work as a social, cultural, and spiritual "symbol" is a response to scientific and technological development, yet claims timeless validity. Topics: frictions between Idealism and Realism, photography and painting, Historicism and Functionalism, Expressionism and Dadaism, Futurism and New Sobriety, Functionalism and Nazi Classicism. GER:3a (DR:7)

5 units, Aut (Neckenig)
119X. European Integration—(Same as Political Science 119X.) Theory-guided overview of the political transformation of Western Europe since WWII. This process developed a unique political system which encompasses and transforms pre-existing national political systems. Focus is on the political integration of Western Europe. Major patterns of institutional development, major competing explanatory and predictive theories of European integration in light of the historical experience, major institutions of the EU, selected problems of governance in a dynamic multi-level system. Economics majors take 5 units. GER:3b (DR:9)
4-5 units, Win (Jachtenfuchs)

120V. Industry, Technology and Cultures, 1780-1945—(Same as Science, Technology, and Society 120V.) Technological innovations of the past 200 years have defined the modern world; human inventions have left indelible marks on culture and civilization. The dialectical relationship between material, intellectual, and social culture on, e.g., modern materials, transport and communications systems, the micro- and macrocosms discovered in physics, chemistry, and astronomy, and the revolutionizing influence of photography, film, and television. GER:3a (DR:7)
4 units, Spr (Neckenig)

122P. Environmental Policy in Europe—(Same as Public Policy 122P, Human Biology 125X.) Introduction to actors, ongoing negotiations, and institutions created in Europe after the beginning of the 1970s to stem tide of environmental degradation. Environmental problems and politics in: Germany, the nation states of the EU, and between East and West in Europe. Central aspects of international environmental affairs in regional setting. GER:3b (DR:9)
4-5 units, Aut (Jakobeit)
Spr (Bedarff)

127X. The Political Economy of Contemporary Germany—(Same as Economics 127X.) Surveys the German economy since WWII. Topics: consequences of the Hitler years and the war; establishment of the W. German economy, the “Wirtschaftswunder,” and subsequent developments; the organization of the economy in E. Germany; economic relations between the two German states; economic integration since unification; and the role of Germany in the world economy. Economics majors take 5 units. GER:3b (DR:9)
4-5 units, Aut (Krüger)

128X. Transition in Germany and Eastern Europe—(Same as Economics 128X.) The transformation process in Eastern Europe has goals of gaining political democracy and a market economy within the shortest time. Economic and political aspects: macroeconomic stability, international opening, and privatization. Reasons behind the division of Europe after WWII, emphasizing the division of Germany, commonalities, and special features of the emerging Stalinist societies. Revolutions and tasks of revolutionary governments after the breakdown of communism. Role of the West, especially the EC. Economics majors take 5 units. GER:3b (DR:9)
4-5 units, Spr (Tempel)

4 units, Win (Neckenig)

166B. Women, Literature, and Political Change—(Same as German Studies 166B, Feminist Studies 164A.) The emergence of new types of women’s writing, which challenge social and political tradition and established literary practices and discourses. Topics: turn-of-the-century social and political discourse of the women’s movement and women’s literature, new worlds opening between the two world wars, women under National Socialism, poetic subject and women’s perspective in post-WWII literature, influence of feminism after 1968, effects of German unification and the backlash. Language credit for advanced German students. GER:3a,4c (DR:8+)
4 units, Aut (Hörnig)

177A. Culture and Politics in Modern Germany—(Same as German Studies 177A.) Key paradigms of modern Germany: German romanticism, the belated state and national identity, National Socialism and the Holocaust, Germany divided and unified. Literary, analytical, and theoretical texts; newspaper articles; film/TV, oral history. GER:3b (DR:9)
4-5 units, Win (Kramer)

177B. Nationalism and Political Culture in Contemporary Germany—(Same as German Studies 177B, History 228V, Political Science 116X.) Contemporary political discourse in Germany against the backdrop of the historical legacies of nationalism, militarism, and anti-Semitism. The emergence and historical permutations of these phenomena in the Weimar Republic, the Third Reich, and the two postwar German states, exploring stated and unstated traces of the legacies in contemporary political culture. Language credit for advanced German students. GER:3b (DR:9)
4 units, Spr (Tempel)

177Y. Architecture and Culture of Modern Berlin—(Same as Art 177Y.) Surveys 19th- and 20th-century Berlin in light of notions of modernity (historical, ethical, aesthetic, artistic, and literary)
that sponsored its renewal and its expansion. At an unprecedented scale, Berlin promoted and witnessed the emergence of a New Architecture for housing, working, and entertainment, including new building types. Architecture engaged with political thought, social theory, and other forms of critical discourse in ways that radically changed its scope and forms. Lectures, visits to urban sites. units by arrangement, Spr (Berdini)

179B. German Film and its European Context—(Same as German Studies 179B.) Cinema, as a mass-reception form of art, emerged in a Europe torn by “the Great War” and the revolutions of 1917-1918. The representations of the salient socio-political conflicts and discourses of the century in German and European film of the period. GER:3a (DR:7)
4 units, Spr (Kramer)

282Y. The Bauhaus—(Same as Art 282Y.) The pedagogic principles, artistic theory, and practical activity of the Bauhaus’s individual laboratories (architecture, design, photography, graphics, tapestry). The Bauhaus (1919-1933) was an artistic idea, a school, and a social project that promoted a variety of artistic experiences to explore in different media the relationship between form and technique. The Bauhaus Archive in Berlin offers the opportunity to view and study relevant objects, projects, and publications. Visits to original sites at Dessau and Berlin. units by arrangement, Spr (Berdini)

GERMAN LANGUAGE PROGRAM

3B. German Language and Culture—(Same as German Studies 3B.) Grammar, composition, and conversation. Designed to increase students’ fluency in the German language as rapidly as possible and to help them take advantage of the many opportunities in Berlin. Corequisite: German Studies 100B.
4 units, Aut, Win, Spr (Friesel-Kopecki)

22B. Intermediate German—(Same as German Studies 22B.) For students who wish to improve their knowledge of the German language and begin reading texts in history, literature, politics, and economics.
4 units, Aut, Win, Spr (Wohlfeil)

100B. Aktives Deutsch—(Same as German Studies 100B.) Required for students enrolled in German Studies 3B; open to students in other German language classes. Active usage of German including vocabulary from a variety of fields and disciplines, and discussion on current issues.
2 units, Aut, Win, Spr (Staff)

ON VIDEOTAPE

See the “School of Engineering” section of this bulletin for course descriptions.

40B. Introductory Electronics—(Same as Engineering 40B.) GER:2b (DR:6)
5 units, Aut, Win, Spr (Masters)

50B. Introductory Science of Materials—(Same as Engineering 50B.) GER:2b (DR:6)
4 units, Aut, Win, Spr (Bravman)

FLORENCE

52. Realism, Utopia, Myth, and Society in Italian Cinema: Bernardo Bertolucci, Pier Paolo Pasolini, and Federico Fellini—(Same as Communication 52, Italian 190F.) Major films in the careers of Bertolucci, Pasolini, and Fellini are used to assess ways in which realism, myth, utopia, and society are theorized and problematized. Topics: ideology and representation, class and specificity of intellectual labor, canonicity, creation of personal mythology of imagination, and memory and reality. (In Italian) GER:3a (DR:7)
5 units, Win (Campani)

106V. Italy: From an Agrarian to a Post-Industrial Society—(Same as History 106V, Political Science 158X.) Italian history from the Risorgimento to the present. Italian society, crises, evolution, values, and the relation to the political institutions existing in different periods. Ideologies and political doctrines, and historical events which contributed to the formation of modern Italy’s predominant subcultures, Catholic and Socialist. (In Italian) GER:3b (DR:9)
4 units, Aut (Mammarella)

111Y. From Giotto to Michelangelo: Introduction to the Renaissance in Florence—(Same as Art 111Y.) Lectures, site visits, and readings reconstruct the circumstances that favored the flowering of architecture, sculpture, and painting in Florence and Italy, late 13th to early 16th century. Emphasis is on the classical roots, the particular relationship with nature, the commitment to human expressiveness, and the rootedness in real-world experience, translated in sculpture and painting as powerful plasticity, perspective space, and interest in movement and emotion. GER:3a (DR:7)
4 units, Win (Verdon)

112Y. The Duomo and Palazzo della Signoria: Symbols of a Civilization—(Same as Art 112Y.) The history, history of art, and symbolism of the two principal monuments of Florence: the cathedral and the town hall. Lectures, site visits, and readings grasp the points of common meaning and ideological difference between the religious and civic symbols of Florence’s history from the time of Giotto and the first Guelf republic to Bronzino and Giovanni da Bologna and the Grand Duchy. GER:3a (DR:7)
4 units, Aut (Verdon)

115X. The Economic History of Italy in the Pre-modern Period—(Same as Economics 115X.) The economic history of Italy during late medieval and
early modern periods. Economic and political situations in Europe, the Mediterranean, and Italy that enabled premodern Italy to become a front-runner in economic development and commercial, industrial, financial, and technological innovations. Emphasizes understanding Italy's economic history within its cultural and social context. Students conduct semi-independent research based on archival material.

5 units, Aut (Greif)

117X. Topics in the Economic History of Modern Italy—(Same as Economics 117X.) Overview of the economic history of Italy following its unification, emphasizing interrelations between the Italian economy and European and world economies. The political and industrial organizational aspects of the period. Students conduct semi-independent research on aspects of either the political economy or industrial organization of modern Italy.

5 units, Aut (Greif)

132F. Representations of Italy through the Eye of the Camera—(Same as Italian 132F, Communication 51.) Social, political, and historical facets of 20th-century Italian culture via their cinematic representations. Film screenings, readings, and first-hand experience provide insights into the changes in Italian society from the end of WW I to the present. Topics: Fascism, the Reconstruction, the economic boom of the 60s, terrorism, regionalism, the Italian family, gender roles, and the female subject as reflected in the Italian cinema. (In Italian) GER:3a (DR:8)

4-5 units, Aut (Greif)

145X. The Integration of Europe—(Same as Political Science 145X, Economics 167X.) Introduction to the politics and policies of the European Community. The major policies of the Community and assessment of their impact in a domestic and international context, and the challenges faced by the Community today. GER:3b (DR:9)

4-5 units, Aut (Campani)

159X. The Political Economy of Industrial Change: Italy and Europe in a Global System—(Same as Economics 159X.) Analysis of structural change and new tendencies of industrial systems. The federal and local role of authorities in promoting the restructuring of industrial organizations. The differences in industrial organization and public policy between the U.S. and Europe. Emphasis is on the Italian experience, mainly in small firm organization and policy. GER:3b (DR:9)

5 units, Win (Bellini)

215V. The Scientific Revolution: From the Renaissance to the 18th Century—(Same as Science, Technology, and Society 125; Philosophy 145P; History 215V.) Focuses on crucial changes in man's view of nature and himself, ca. 1400 to 1750. The interplay between ideas and the ways of thinking across disciplinary boundaries. Scientific developments as major intellectual changes. Topics: Renaissance man, the new attitude toward machines and technology, the birth of a new physics, medicine and natural history, the artist and the scientist. GER:3a (DR:8)

4-5 units, Win (La Vergata)

233. Dante's Divine Comedy—(Same as Italian 233.) Intensive study of Dante's poem in relation to the culture and history of medieval Italy, with emphasis on Florence and the Tuscan region. Concepts of modernity and antiquity in the Middle Ages, gender and genre in Dante's Christian poetics, medieval and ancient theories/theologies of history, writing as rewriting in the Comedy, Dante and natural sciences, Dante's Christianization of classical epics, and Dante's theory of universal monarchy.

units by arrangement, Win (Schnapp)

233V. Italian Politics since 1989 in its International Context—(Same as History 233V, Political Science 133X.) The impact of recent democratic upheavals in Russia and Eastern Europe on current political developments in Italy. Discussion of traditional parties, Right wing and new political groupings, and the Italian Left in the context of the ideological and institutional transformations undergone by the latter since the late 1970s. (In Italian) GER:3b (DR:9)

4-5 units, Win (Benvenuti)

234V. Rebellion and Renewal: The Italian Renaissance—(Same as History 234V.) The Italian Renaissance as a transition from rural to urban, from tradition to innovation, from cosmology to individualism, and from religion to politics. Readings: Boccaccio, Machiavelli, Pico della Mirandola, and Leonardo da Vinci. The decline of the Renaissance and the depth of its cultural legacy. GER:3a (DR:8)

4-5 units, Aut (Biocca)

251. F. T. Marinetti and Futurism—(Same as Comparative Literature 251, French and Italian 251E.) Inquiries into the history and influence of the Futurist movement. The links between avant-garde cultural experimentation and themes of speed, acceleration, intensification, and novelty that have shaped modern/postmodern ideas concerning experience, subjectivity, rhythm, power, and production.

units by arrangement, Win (Schnapp)

ITALIAN LANGUAGE PROGRAM

The Italian language program is currently under review with the goal of engaging all students in scholarly work in Italian. All students choose from the following alternatives:
1. Enroll in one of the courses conducted primarily in Italian.
2. Enroll in directed reading conducted primarily in Italian.
3. Enroll in a course at the University of Florence. (These courses typically run from October to mid-March, so this option is available only to two-quarter students.)

4. Complete a term paper (for any course) that is written in Italian and draws extensively on Italian-language sources. Students writing papers in Italian for English-language courses should discuss their decision with the director by the end of the fourth week of the quarter.

All students are encouraged to work with the language resource person, offering group and individualized support for language issues.

KYOTO

The Stanford Japan Center in Kyoto houses two separate academic programs: the Kyoto Center for Japanese Studies (KCJS) and the Stanford Center for Technology and Innovation (SCTI). KCJS is administered by Stanford for a consortium of American universities. For current information on KCJS, consult the web site at http://www-osp.stanford.edu/KCJS or contact Overseas Studies for a brochure. The courses listed below are offered by the SCTI program.

17R. Religion and Japanese Culture—(Same as Religious Studies 17R.) Introduction to the importance of religion in Japanese culture, covering the major traditions of the country. Visits to relevant religious centers for observation of current religious practices and participate where appropriate (e.g., meditation session). Topics: relation between religion and culture; description of ancient Japanese religion and Shinto; outline of Buddhist schools of Heian Japan; introduction to Zen Buddhism as it flourished in the Kamakura period; analysis of Confucianism, as originally conceived in ancient China, and as transmitted to Japan in the Edu period in its Neo-Confucian form; discussion of some characteristic modern practices. GER:4a (DR:2)
4-5 units, Spr (Staff)

21. Research Project—Independent research projects on significant aspects of Japanese culture, society, or public policy. Students interested in developing the project as a web page should take a home campus class on creating web pages or have equivalent experience.
2-3 units, Spr (MacDougall)

23. Introduction to Team-Based Product Design-Development in Japan—Multidisciplinary experience in three-product design challenges of deepening complexity or stressing cross-cultural issues, and undertaken within the surrounding community. Students in teams of three have a graduate student "coach" from Kyoto, Nagoya, or Osaka Universities who supports the design teams in Japanese technology access, language, and culture.
4 units, Spr (Leifer)

197K. Engineering and the Modern City—(Same as Engineering 197K.) Focuses on contemporary Japanese cities as viewed from different engineering perspectives, including those concerned with civil engineering, architecture and urban planning, earthquake resistant construction, intelligent buildings; and applications of artificial intelligence in areas like transportation, water quality, waste management, and environmental monitoring. Combines lectures by Kyoto University engineering faculty with on-site visits in the Kansai region.
3 units, Spr (Hotta)

215X. The Political Economy of Japan—(Same as Political Science 215X.) Institutions and processes in the political organization of economic activity in modern Japan. The interaction of public and private sector institutions in the growth of Japan’s postwar economy. Organization and workings of key economic ministries and agencies of the government, private sector business groupings, government interaction, and public policy making. The transformation of Japanese industrial policy from the rapid growth of heavy and chemical industries to the promotion of high technology and communications industries. International, political, and economic ramifications of the structure and importance of Japanese capitalism. GER:3b (DR:9)
4-5 units, Spr (Kume)

JAPANESE LANGUAGE PROGRAM

3K. First-Year Modern Japanese—(Same as Asian Languages/Japanese 3K.)
5 units, Spr (Fujiwara, Veda)

21K. Second-Year Modern Japanese, First Quarter—(Same as Asian Languages/Japanese 21K.)
5 units, Spr (Uemiya)

23K. Second-Year Modern Japanese, Third Quarter—(Same as Asian Languages/Japanese 23K.)
5 units, Spr (Yamaoka)

100K. Advanced Japanese—(Same as Asian Languages/Japanese 100K.)
5 units, Spr (Hotta)

ON VIDEOTAPE

See the “School of Engineering” section of this bulletin for course descriptions.

40K. Introductory Electronics—(Same as Engineering 40K.) GER:2b (DR:6)
5 units, Spr (Masters)

50K. Introductory Science of Materials—(Same as Engineering 50K.) GER:2b (DR:6)
4 units, Spr (Braunmahn)

113. Electronic Circuits—(Same as Electrical Engineering 113.)
3 units, Spr (Flynn)
182. Computer Organization—(Same as Electrical Engineering 182, Computer Science 112.)
4 units, Spr (Flynn)

MOSCOW

15. Academic Internship—Placements in areas such as journalism, health care, education, international ventures, and technology as an introduction to Russian society and work experience. Regular meetings with a mentor develop an in-depth evaluation of observations. Findings and analysis are summarized in an academic paper.
5 units, Aut, Win (Bratersky)

16. Tutorial—Meet with tutors individually or in very small groups on chosen topic.
3-5 units, Aut, Win (Bratersky)

21. Ethnic Moscow—Synthesizes reading on ethnicity in Russia in the context of visits to Armenian, Jewish, Georgian, Tatar (Muslim) and Russian communities, places of worship, and cultural events.
3 units, Aut (Abashkin)

22. Russian Culture in the 90s—Weekly field trips to exhibitions, performances, and concerts representing modern trends in Russian theater, art, music, and architecture. Field sessions are preceded by introductory reading assignment and followed by discussion in classroom.
2 units, Aut (Staff)

24. The Architecture and Art of Moscow: A Walking Tour—Weekly excursions to the major monuments of Moscow architecture (15th-20th centuries): the Kremlin, monasteries; suburban estates (Kolomenskoe, Kuskovo, Arkhangelskoye); classical, art nouveau, and constructivist architecture. Visits to major art collections: Armory Chamber, Rublev icon museum, Tretiakov Gallery, Pushkin Museum.
units by arrangement, Aut (J. Kollmann, N. Kollmann)

112X. Environmental Biology of Russia—(Same as Human Biology 112X.) The ecological situation in modern Russia and other states of the former Soviet Union, unique challenges to conservation caused by the social and economic processes of the transition period, and what can be done to improve the situation by Russia and the world community. Overview of ecological science with an emphasis on phenomena important for interactions between humans and nature; problem areas such as Volga delta, Caspian and Aral Seas, Lake Baikal, taiga zone, and Chernobyl; and economic, social, and political aspects of nature conservation in the post-communist state. GER:2a (DR:5)
5 units, Aut (Yampolsky)

113W. Sociology and Social Psychology of Modern Russian Society—(Same as Sociology 113W.) Focuses on the changing institutional organization of society. Work life and careers, stratification and inequality, gender differences, family life, values and beliefs.
5 units, Aut (Titma)

119X. Russian Politics—(Same as Political Science 119X.) Introduces the political, cultural, social, and historical background of Russian domestic life and foreign politics, the major issues in Russian political life, and political forces currently playing a role in the Russian arena. The origin of major interest groups and political concepts affecting the struggle in Russia. The inter-relationship among politics, economic issues, ethnic-territorial problems, and security matters in Russia itself, in the countries of the former Soviet Union, and on an international level. GER:3b (DR:9)
5 units, Aut (Bratersky)

120X. Economic Reform and Economic Policy in Modern Russia—(Same as Economics 120X.) Issues of Russian economic history as a background, reasons and logic of economic transformation, major components of post-communist economic transformation doctrine. The mechanism of economic policy decision making in modern Russia, realistic patterns and alternatives of economic development, and the logic and direction of the transformation of the elements in the Russian economic system. Discussions with politicians involved in economic decision making.
5 units, Aut (Mau)

121V. Russia in the Age of Nobility 1700-1840: State, Society, and Culture—(Same as History 121V.) Insight into a period of Russian history and culture where Russians produced achievements in literature and the arts, but failed to resolve the social and institutional problems created by rapid transformation. The reforms of Peter the Great through the Slavophile-Westernisers controversy established the paradigms of Russia's historic development and raised issues still determining the intellectual agenda today. GER:3a (DR:7)
5 units, Aut (Zorin)

146X. Contemporary Issues of Russian Society—(Same as Political Science 146X.) Forum addresses major issues of Russian society today. The problems facing an individual in Russia, issues confronting Russia, issues confronting Russian society, and the main aspects of multiple crises evolving after the collapse of the Soviet Union on post-Soviet space. Prerequisite: some background in Russian studies.
4 units, Win (Bratersky)

164C. Gender and Cultural Change in Early Modern Russia—(Same as Feminist Studies 164C, History 217V.) A wide-ranging survey of social values and religious practices in Russia in an era of cultural change (16th-18th centuries). Handbooks of deportment, the changing role of women, cultural ideals from saints' lives to secu-
RUSSIAN LANGUAGE PROGRAM

10M. Intensive First-Year Russian—(Same as Slavic Languages 10M.)
3-5 units, Aut (Boldyeva)

51M. Second-Year Russian I—(Same as Slavic Languages 51M.)
6 units, Aut (Kuznetsova)

53M. Second-Year Russian II—(Same as Slavic Languages 53M.)
6 units, Win (Kuznetsova)

111M. Third-Year Russian I—(Same as Slavic Languages 111M.)
6 units, Aut (Shimanskaya)

113M. Third-Year Russian II—(Same as Slavic Languages 113M.)
6 units, Win (Shimanskaya)

177M. Fourth-Year Russian I—(Same as Slavic Languages 177M.)
6 units, Aut (Kurganova)

179M. Fourth-Year Russian II—(Same as Slavic Languages 179M.)
6 units, Win (Kurganova)

OXFORD

48. Crisis and Change in West European Politics—Investigates the transformations in politics and society in West European nations over the past 20 years. The changing European welfare state; changes in party systems; electoral volatility, the emergence of business as a political actor; demise of corporatism; rise of neoliberalism, shrinking of the state. Cross-national empirical variations and competing theoretical explanations of these changes.
units by arrangement, Aut (Wood)

50. Transatlantic Economic and Security Relations in the Post-War Period—Focuses on the changing nature of transatlantic relations over the past 50 years, including issues of economic policy, trade, and security. Topics: U.S.-UK collaboration to set up post-War economic institutions; the U.S. role in the reconstruction of European economies and establishment of European community; security issues of the Cold War period and establishment of NATO; partition of Europe and the role of the U.S. in eventual German unification; trade tensions and perception of conflicting economic and strategic relations. Seminars by outside speakers with practical experience in transatlantic relations.
5 units, Win (Josling)

51. Britain in the Era of the Two World Wars—WW I and II are crucial to understanding modern Britain. The causes of Britain's involvement in these conflicts, her role in their final outcome, and their impact on Britain's role as a world power. The effects of the wars on British politics, culture, and the everyday lives of the British people, both combatants and non-combatants. Films, literature, reminiscences, and conventional historical sources.
GER:3b (DR:9)
5 units, Win (Tyack)

52. A New Europe? Conflict and Integration since 1980—In the past 15 years, relations between the states of Europe have been fundamentally altered by the acceleration of European integration in the West and the collapse of state-socialism and Russian hegemony in the East. The nature and implications of these changes for transnational relations between European nations, and for domestic politics inside these nations. Topics: European Union before and after Maastricht, political union and the problem of sovereignty, new Germany in new Europe, the migration and return of extremist politics, European security after the Cold War; democratization in Eastern Europe. Guest experts present topics, followed by questions and discussion.
units by arrangement, Win (Wood)

53. British Cinema and Society 1918-1940—(Same as Communication 53.) Interwar Britain was a time of profound social transition, as a society traumatized by war encountered the shock of modernity. Cinema played a vital part in the process of modernization. With the emergence of Alfred Hitchcock and a new generation of world-class commercial film-makers, the influx of European immigrants, and the birth of a documentary avant-garde, British cinema offered a record of "the maddest and yet the most progressive years in the country's history." Lectures and seminars, supported by weekly screenings of representative films; readings on the social history of the period and relevant literature on film.
GER:3a (DR:7)
4 units, Aut (Christie)

54. Signs of the Times: Culture, Media, and Society in Britain, 1960-80—The social history of Britain in 60s and 70s. New cultural forms that emerged in film, broadcasting, music, and visual media during this period, together with distinctive techniques and ideologies developed to explain them. Examines documented case studies in terms of reception and contemporary significance. Social realism in fiction, television, and cinema; the rise of British pop music; feminism and media; psychoanalysis and cultural theory; pop and conceptual art; satire and comedy; postcolonialism, etc.
units by arrangement, Win (Christie)

92Z. Poetic Appreciation: The 20th Century—(Same as English 92Z.) Open only to students
majoring in English. Critical appreciation of poetry through a close study of the works of selected 20th-century British and Irish poets: Yeats, Hardy, Owen, Eliot, Auden, and Larkin.

5 units, Win (Wordsworth)

111X. Race and Ethnicity in Modern Britain—(Same as Political Science 111X, Sociology 145X.) A history of immigration and the settlement of ethnic minority groups in Britain: work, discrimination, attempts to achieve economic opportunity and equality. The synthesis between W. Indian, Asian, African, and traditional English cultures. GER:3b (DR:9)

3 units, Spr (Wordsworth)

114Z. English Literature 1509-1642—(Same as English 114Z.) Open only to students majoring in English and related subjects. Taught jointly for Stanford students and second-year St. Catherine's undergraduates. English literature from the beginning of Henry VIII's reign to the onset of the Civil War, excluding Shakespeare. The poetry, prose, and drama of the period is placed in its literary, cultural, and historical contexts, and key texts are read closely.

5 units, Aut (Lastgarten)

116Z. English Literature 1642-1740—(Same as English 116Z.) Open only to students majoring in English and related subjects. Taught jointly for Stanford students and second-year St. Catherine's undergraduates. English literature from the Civil War to the middle of the 18th century. The poetry, prose, and drama of the period is placed in its literary, cultural, and historical contexts, and key texts are read closely.

5 units, Win (Lastgarten)

117W. Social Change in Modern Britain—(Same as Sociology 117W.) Changes in the social institutions, attitudes, and values in Britain over the past 20 years. Social changes occurring as a consequence of the Thatcher years of government. Changes to the British economy, Welfare State, National Health Service, the education system, the criminal justice system, gender relations, marriage, divorce, reproduction, and the family. The consequences of this in terms of British competitiveness, income distribution, wealth and poverty, social class, health and illness, educational attainment and skills development, crime and family life. Some theoretical ways sociologists analyze societies and social change. GER:3b (DR:9)

4-5 units, Spr (Davies)

141V. European Imperialism and the Third World, 1870-1970—(Same as History 141V, Political Science 148X.) European imperialism from its zenith in the late 19th century to the era of decolonization after WW II. The effects of western imperialism in different parts of the "Third World."

The legacy of imperialism and decolonization to the modern world. GER:3b (DR:9)

5 units, Spr (Darwin)

142V. From Decolonization to Democratization, 1965-1995: Britain and Africa in the Postcolonial Era—(Same as History 142V, Political Science 117X.) Starting from Harold Macmillan's "wind of change," Britain's relations with her former African colonies and the evolving role of the Commonwealth. Wider international issues as they relate to Africa. Defining features of the postcolonial African continent such as military coups, internal conflict and external intervention, regional cooperation, aid, and the democratization movement. GER:3b (DR:9)

5 units, Win (Kirk-Greene)

145V. The Making of Shakespeare's England 1558-1640—(Same as History 145V.) English society and politics between the accession of Elizabeth I and the summoning of the Long Parliament in 1640. Topics: social structure and property ownership to the legal system and growth of Parliament, inherited cosmology, the remembered past (Wars of the Roses, Reformation), and its implications in Elizabethan and early Stuart England.

4-5 units, Aut (Seaver)

146U. Urban History in Britain, 1500 to the 20th Century—(Same as Urban Studies 146U, History 243V.) The development of Britain's towns and cities from several angles, emphasizing their physical growth. How visual evidence can contribute to knowledge of past. Why towns grew at different periods, and how they adapted to and contributed to Britain's changing economy, especially the past 200 years. Housing and community life. Contemporary urban problems within historical context. Illustrative material from Oxford and London. Parallels with the urban history of the rest of Britain and the world. GER:3b (DR: 9)

4-5 units, Spr (Tyack)

146V. African History through the African Novel: Tropical Africa 1914-1994—(Same as History 146V, English 189Y.) Analysis from historical texts of selected themes in the modern history of tropical Africa, c. 1900-1970, and how these topics have been portrayed in the African novels. GER:3a,4a (DR:2 or 9)

5 units, Aut (Kirk-Greene)

150Z. Poetic Appreciation: The 19th Century—(Same as English 150Z.) Open only to students majoring in English. Critical appreciation of poetry through a close study of the works of selected 19th-century British poets, from Tennyson to Yeats.

5 units, Aut (Wordsworth)

154Z. English Literature 1740-1832—(Same as English 154Z.) Open only to students majoring in English and related subjects. Taught jointly for
Stanford students and second-year St. Catherine’s undergraduates. Survey of English romantic literature. The poetry, prose, and drama of the period is placed in its literary, cultural, and historical contexts, and key texts are read closely.

5 units, Spr (Wordsworth)

167. The Economics of the New Europe: East meets West—(Same as Economics 167X.) Current economic issues of the European Union, including incorporation of Central and Eastern Europe, debate over economic and political integration of the UK in the EU, problems of economic convergence, and trade policies of the new Europe. Prerequisites: Economics 51, 52 or equivalent.

5 units, Win (Josting)

168X. The Economic Organization of Science and Technology in the West since 1600—(Same as Economics 168X.) Comparative institutional analysis of the historical emergence and development of three modes of organizing the scientific pursuit of knowledge. The underlying economic logic of salient institutional features and the social norms of modern, autonomous, “open” science communities. The differentiation from modes of organization associated with proprietary and state-controlled scientific activity. The implications of different institutional structures and their interactions for efficiency of research resource allocation.

5 units, Spr (David)

171X. Constitutional Law in Britain—(Same as Political Science 171X.) The historical foundations of constitutional law in Britain and its philosophical framework; comparisons with the constitutional law of other countries where appropriate. Lectures analyze the main features of the British constitution, the Cabinet government, the role of Parliament, the question of sovereignty, the nature of the judiciary, civil rights, and the implications of membership of the EC. GER:3b (DR:9)

5 units, Aut (Getzler)

171P. Ethics and Economics—(Same as Philosophy 171P.) The separation of economics from ethical theory. Adam Smith, David Ricardo, and John Stuart Mill conceived of economics as related to the study of ethics and politics. Modern economic theory approaches economics as a technical science of engineering. The writings of classical and contemporary economists. The nature of this separation and the arguments given in support of it. Focuses on the complex and substantive views of rationality and motivation that divide earlier theories from modern economics.

4 units, Spr (Satz)

172P. Property—(Same as Philosophy 172P.) Arguments that have historically sought to justify different forms of property, i.e., those that seek to defend property arrangements on grounds of efficiency, on rights, and on their contribution to personal and personal flourishing. Authors: John Locke, John Stuart Mill, Robert Nozick, G. W. F. Hegel, Karl Marx, and Ludwig Von Mises.

4 units, Spr (Satz)

173X,Y,Z. Shakespeare—(Same as English 173X,Y,Z.) Open only to students majoring in Drama, English, and related subjects. Taught jointly for Stanford students and second-year St. Catherine’s undergraduates. A study of the complete dramatic oeuvre of Shakespeare. Focus is on the sources of the plays, historical and dramatic content, and use of language.

173X. The Comedies
5 units, Aut (Gearin-Tosh)

173Y. The Tragedies
5 units, Win (Gearin-Tosh)

173Z. The Late and Problem Plays
5 units, Spr (Gearin-Tosh)

174X. Contemporary Architecture in Britain and Europe—(Same as Art 174X.) Architecture and architectural technology in Europe since the 1940s, concentrating on the development of diverse architectural theories and practices, and the assessment of current architectural issues. Visits to significant architectural sites in Oxford, London, and elsewhere. Students develop a critical attitude toward architecture and its contribution to the built environment and deliver an illustrated seminar paper on a building of their choice. GER:3a (DR:7)

4 units, Win (Stevenson)

221Y. Art and Society in Britain—(Same as Art 221Y, History 244V.) Themes in late 19th- and early 20th-century British art. Painting, sculpture, architecture, and design, and comparisons between the British experience and that of continental Europe and U.S. Texts address problems relating to the role of art and the artist in modern society. Visits to relevant buildings and collections. Student topic is researched in depth, presented to class for discussion (with visual aids where relevant), and written up as a substantial paper. GER:3a (DR:7)

5 units, Aut (Tyack)

240V. The Invention of the Metropolis: London, 1550-1700—(Same as History 240V.) The dynamics of demographic growth, new poverty and crime that accompanied that growth, the new commercial entertainment industry made possible by metropolitan growth, and the new concept of urban civility present by 1700. Documents are from contemporary maps and views, parish registers, crime literature, sermons, and plays.

5 units, Aut (Seaver)

254Z. Drama in Britain Today—(Same as English 254Z, Drama 158D.) The classics of world drama and some contemporary plays. The meanings of the works and the theatrical techniques used to complete them on stage. Weekly visits to the theater. GER:3a (DR:7)

4 units, Spr (Mateer)
30. Multiculturalism in Comparative Perspective: France, Germany, and the U.S.—The concept of Nation and State in forming national identity and the role of myth in this process. Problems and issues of recent immigrant groups and how minorities express their cultural, social, and ethnic loyalties and allegiance. (In French and English) GER:3b (DR:9)

4 units, Win (Lacorne)

31. Art and Society in 18th-Century France—18th-century France was a society of changing ideology and social forces, coming to terms with the breakdown of central political power. Art of this age is a reflection of the society in which it emerged and the tastes of its new clientele. The image of political domination gave way to expressions of private emotions, sensuality, realism, and then to interpretation of new ideals and ideologies in the making. Watteau, Boucher, Chardin, Quentin de La Tour, Greuze, David, Houdon, etc. Weekly sessions in museums of Paris. (In French and English) GER:3a (DR:7)

4 units, Win (E. Halevi)

32. Theater in France—The development of theater from the Middle Ages to modern times. Attending plays in Paris is coupled with literary analysis. Anthropological and comparative literary analysis of the myth of Don Juan. (In French and English)

4 units, Win (Mercier)

111. Health Systems and Health Insurance: France and the U.S.—A Comparison—(Same as Public Policy 111, Human Biology 153X.) Health systems respond to the health needs of a given population. Must they be organized, or left to the free play of the market? What is the role of the state in the delivery of health care? Focus is on the evolution of the health profession in France and the U.S. Developments in health policy and reform. The Clinton health reform, the Oregon plan, measures restraining professional autonomy such as prescription guidelines in the French Medical Convention between doctors and the state. Is the solution to the increase of health expenditures and reduced access to health care the end of autonomy for the medical profession? (In French and English)

4 units, Win (Giraud)

120Y. Post-Naturalist Painting—(Same as Art 120Y.) French painting from time of first “mature” Impressionist pictures (about 1874) to about 1907. Impressionism, despite a direct study of nature, seriously challenged the concept of a naturalist picture. This fostered experiments that attempted to shape a new paradigm for the practice of painting; a historical “map” of these experiments shows how picture-making, especially material techniques, is connected to contemporary developments in science, industry, and other cultural expression. Topics: later works of Impressionists; Cézanne; Moreau, Redon and Rops; van Gogh and the Fauves; Gauguin; Seurat and Signac; Puvis de Chavannes and Whistler; Toulouse-Lautrec and the Nabis; interior designs of Guimard and other members of Art Nouveau. Some reading in French.

4 units, Win (Marrinan)

121X. The Left in Europe—(Same as Political Science 121X, Sociology 115W.) Left and Right are the two most important categories of European political life, culture, and identity. The historical, sociological, and political science methods of analysis used to understand the stability and shifts of the Left in Western Europe, and in France in particular. Introduction to the concepts of the Left and the methods of analysis used. Communism and Social-Democratic parties in Europe. Interaction between the various components and their influence on the development of the Left as a whole. (In French and English) GER:3b (DR:9)

5 units, Win (Lazar)

122X. 20th-Century French and European Economies—(Same as Economics 122X.) Reviews French economic history. The framework, actors, and results of French and European economies. France’s economic relations with other countries, using international models for comparison. (In French and English) GER:3b (DR:9)

5 units, Aut (Balleix)

131V. Political Culture in 18th-Century France—(Same as History 131V.) At end of the 18th century, the French passed from one political universe to another, “Ancien Régime” to Revolution. The practice and language of politics in both eras. Through literary and historical texts, examines the way that government opposition, reformers, and dissenters articulated and confronted their political claims during turbulent decades before the Revolution. The impact of revolutionary debates in shaping revolutionary principles, language, and ideology. (In French and English) GER:3b (DR:9)

5 units, Aut (R. Halevi)

131X. New Factors in World Affairs as Challenges to Foreign Policy: The Case of French-African Relationship—(Same as Political Science 131X.) Global interdependence, military, diplomatic, economic, humanitarian, religious, and cultural issues are linked, as are domestic and external fields. The postcolonial link between France and Africa. The role of French firms in Africa, Islam in France, migrations, NGOs, smuggling, etc. in the French-African relationship. This test case illuminates one of the theoretical stalemates of today’s world politics. (In French and English)

4-5 units, Aut (Charillon)

184B. Art and Science of Creativity—(Same as Psychology 184B.) Theories of creativity, case
OVERSEAS STUDIES PROGRAM

studies of eminent creators, laboratory studies, and introduction to techniques to foster creative thinking. Is talent innate or developed? What are the personal traits for a person to be creative? Which processes lead to a creative product? (In French and English)

4 units, Aut (Getz, Lubart)

211X. Political Attitudes and Behavior in Contemporary France—(Same as Political Science 211X.) The institutions of the Fifth Republic, the main political forces and their evolution. Electoral behavior, taking into account other forms of political action such as the demonstrations for the defense of schools (1984) and the "lycee" students (1990), or the protest that followed the desecration of the Jewish cemetery in Carpentras. Attitudes and values are linked to voting choice. (In French and English) GER:3b (DR:9)

4-5 units, Aut (Mayer)

221Y. Constructions of the Masterpiece in 19th-Century France—(Same as Art 221Y.) Both a workshop in art-historical research methods and an opportunity to study a major work of art in depth. Each student selects a single painting or sculpture in a Paris public collection or building and investigates from first idea to finished object the creative process as recorded in drawings, sketches, notebooks, etc. available in Paris museums and libraries. Group discussions and lectures focus on mechanics and logistics of this kind of inquiry. Students report in informal talks, preferably in museums, and prepare a summary paper. Some reading in French.

4 units, Aut (Marrinan)

222Y. Paris as Artifact I: Designing Paris—(Same as Art 222Y.) How goals of Parisian urban design, from late 18th century to Haussmann's master plan, took shape. The concern to develop a uniquely "urban" space different from balkanization of individual neighborhoods, yet linked to the past by "staging" the city's monuments. Projects of urban renewal and expansion. The emergence of new forms of sociability during the early 19th century. Habits of city living that developed before the 1850s informed solutions actually built during later years. Wide sidewalks, uniform facades, showcasing monuments, and extensive "urban furnishings" are all based on Paris being used in particular ways. Some reading in French.

4 units, Aut (Marrinan)

222Z. Paris as Artifact II: Decorating Paris—(Same as Art 222Z.) Studies some principal projects of large-scale public painting and sculpture executed during the 19th century, emphasizing the nature of imagery commissioned by a succession of politically dissimilar regimes. Questions about the types of monuments decorated, kinds of decoration, and iconographic programmes adopted to general issues about role of government in culture, and how ideas of "Parisian" and "French" shifted and/or became intertwined. Some reading in French.

4 units, Win (Marrinan)

FRENCH LANGUAGE PROGRAM

21P. Intermediate French I—(Same as French 21P.)

5 units, Aut, Win (Mercier)

23P. Intermediate French II—(Same as French 23P.)

5 units, Aut, Win (Grée)

124P. Advanced French I—(Same as French 124P.)

5 units, Aut (Panard)

125P. Advanced French II—(Same as French 125P.)

5 units, Win (Ricci)

126P. French Writing Methodology: Techniques of Expression—(Same as French 126P.) Preparation and support for students enrolling in the Paris University system.

3 units, Aut (Grand-Clement)

ON VIDEOTAPE

See the "School of Engineering" section of this bulletin for course descriptions.

50P. Introductory Science of Materials—(Same as Engineering 50P.) GER:2b (DR:6)

4 units, Aut, Win (Bravman)

PUEBLA

The Puebla program has distinct academic focal points: development economics and cultural studies. Students are expected to have completed significant prerequisite course work in one or the other of these tracks before participation in the program.

16. Writing Workshop—In conjunction with the plenum course, the workshop prepares students for writing academic papers in Spanish.

2 units, Win (Staff)

106X. Political Change in Contemporary Mexico—(Same as Latin American Studies 106.) Plenum course for all Stanford students participating in the program in Puebla. Focus is on contemporary issues related to federalism, electoral reform, and the development of NAFTA.

5 units, Win (Morales)

108X. Race and Ethnicity in Mexico—(Same as Latin American Studies 108X, Anthropology 15IX.) The meanings of categories of social differentiation in the historical experience of Mexico and the cultural construction of social identities based on selected features of human biology and shared cultural traditions. Provides the conceptual tools and empirical knowledge to understand the nature and content of social evolution in
Mexico and the diverse forces that historically have shaped the construction of identity systems in the country.

5 units, Win (Shadow)

110X. Social and Political Reflections in the Art of Prehispanic Mexico—(Same as Latin American Studies 110X, Anthropology 148X.) The political and social roles of iconography in art and architecture in prehispanic Mesoamerica. Emphasis is on the relationship between style, ethnicity, and cosmovision, the development of regional and "international" styles, and the historical significance of diagnostic themes and characteristics.

5 units, Win (Plunket)

112X. Economics of Emerging Financial Markets—(Same as Economics 112X, Latin American Studies 113S.) Issues related to emerging financial markets: institutions, behavior of economic agents, and evolution. Analytical overview with regard to the relation of financial development and growth. Firms typical of developing countries; their financial and control structure. The nature of emerging stock markets, causes and consequences of financial crises, and links between monetary policy and economic activity.

5 units, Win (Castañeda)

114X. Development Macroeconomics: The Mexican Case—(Same as Latin American Studies 114X, Economics 118X.) Issues relevant in developing economies and the structures which make them different to the industrialized world. A thorough analysis in relation to the Mexican economy. Recent stabilization programs are analyzed by means of traditional tools and adjusted to the institutional framework of Mexico. Literature on growth, political economy and structural reforms is reviewed and applied to the Mexican case.

5 units, Win (Cárdenas)

SANTIAGO

5. Director's Seminar—Weekly seminar with presentations on current issues and events in Chilean political and cultural life.

2 units, Aut (Fuenzalida)

11W. Research Methods—Open only to students enrolled in Research Module. Preparatory seminar on research methods offered by the person who is the primary research supervisor for the students. Students develop project topics and research designs. Corequisite: 12W.

2 units, Win (Staff)

12W. Research Tutorial—Open only to students enrolled in Research Module. Independent research with a research supervisor in Chile to develop an extended paper associated with the central topic of the research module. Corequisite: 11W.

5 units, Win (Staff)

34. Political Systems in Latin America—The social structure of the major Latin American countries is analyzed to understand their political party systems. The organization and coexistence of sectoral interests, the impact of foreign debt, and the recent historical dimension and exploration of alternative future scenarios.

5 units, Win (di Tella)

106H. Man-Environment Interactions: Case Studies from Central Chile—(Same as Human Biology 106H, Biology 106Z, Latin American Studies 122X.) Problems in rural and urban areas (pollution, over-exploitation of resources, and deterioration of the landscape) are all closely linked to social problems. The consequences of human action on the environment and possible actions to reverse the situation. GER:2b (DR:6)

5 units, Aut (Hajek)

111. Social Heterogeneity in Latin America—(Same as Sociology 111, Latin American Studies 121X.) Latin America is characterized by social heterogeneity and inequality. An interpretation of these phenomena, focusing on social, ethnic, gender, political, and economic dimensions. Their historical roots and unfolding during the periods of industrialization, the '60s, '70s, and '80s, and the contemporary situation. GER:3b (DR:9)

5 units, Aut (Valdés)

112X. Political and Social Transformations in Latin America—(Same as Political Science 112X, Latin American Studies 128X.) Latin American society of the post-WW II period, main changes of the 60s, authoritarian phenomena, and democratization processes. Foci for the analyses: the State, the system of representation, social structure, socio-economic reforms, the actors and the mobilization, ideology, and culture. Two dimensions: global Latin America, considering the variety of the region; and Chilean reality. GER:3b (DR:9)

4-5 units, Aut (Mendez)

116X. Research Seminar in the Humanities: Contemporary Representations of Latin American Society—(Same as Latin American Studies 116X.) Topics: constants and variations in themes and the world vision of Latin America in media and the arts; aesthetic alternatives of realism; traditional genres in modern fashion; legal and economic policies affecting the arts and media; rituals in collective reception, the private and the public in summer festivals.

5 units, Win (Hurtado)

117X. Women in Latin American Society—(Same as Latin American Studies 117X, Feminist Studies 164B, Sociology 174S.) Develops the capacity to analyze the condition of women and dominant gender relations in Latin American countries, building on research questions and identifi-
Cultural changes that have taken place in Chile under conditions of economic liberalization and political democratization at all three levels of culture—elite, mass-media, and popular or folk. The reception of cultural meanings from the world socio-structure (the U.S., EU, and Japan), its reformulation to respond to local conditions, and its export under the shape of cultural artifacts that can be understood by the non-Latin American members.

Innovative elements rooted in the regional-local culture. GER:3b (DR:9)

5 units, Win (Fuenzalida)

120X. Modernization and Culture in Latin America—(Same as Latin American Studies 120X, Anthropology 104X, Spanish 290Z.) The intellectual and cultural expressions of Latin America against the background of modernization. Latin American modernization as a constant tension between: rationalization and subjectification, change and identity preservation, and the logic of economic development and the logic of the culture. GER:3a (DR:7)

5 units, Aut (Subercaseaux)

129X. Latin America in the International System—(Same as Latin American Studies 129X, Political Science 137X.) Analysis of Latin America’s role in world politics with emphasis on U.S.-Latin American relations: the history of U.S.-Latin American interactions, national interest in the definition, and models for explaining U.S.-Latin American relations. Important themes in Latin America’s evolving relationship in the international system. GER:3b (DR:9)

4-5 units, Win (Rojas)

130X. Latin American Economies in Transition—(Same as Latin American Studies 130X, Economics 165X.) Introduction to the main debates and approaches developed to understand and analyze the economies of Latin America. Recent processes of transition to market economies. Common characteristics among countries of the region; the differences and special traits of individual countries. Historical, analytical, and empirical perspectives on topics at the center of controversies and specific policy problems over several decades. GER:3b (DR:9)

5 units, Aut (Muñoz)

158S. Theater and Society—(Same as Drama 158S, Latin American Studies 127X, Spanish 127S.) The creation, production, and communication of Chilean theater in its correspondence and enlightenment of Chile’s and Latin America’s economic, political, cultural, and social changes during the last three decades. Theater in its institutional organization, its ways of elaborating an aesthetic “language” as a form of knowledge and expression of reality, and its effect on theater audiences and cultural life in the whole. The ways theater reconstructs and interprets cultural heritage and how it activates critical thought and new perceptions in the context of different cultural climates and dominant projects of life and development. GER:3a (DR:7)

5 units, Aut (Hurtado)

162X. Core Seminar: Ecology-Policy Studies—(Same as Latin American Studies 162X.) Provides students the intellectual depth and background to carry on research in the field and exposes them to the environment of functioning research groups.

5 units, Win (Hajek)

163X. Latin America in the International Economy—(Same as Economics 163X, Latin American Studies 119X.) The external economic relations of Latin American countries. Similarities and differences among countries, focusing on the last 15 years. Analytical and empirical elements for interpretation of policies and the outcome. Trade, external debt, capital flows, and the inter-relationships between domestic economy and overall growth. GER:3b (DR:9)

5 units, Win (FFrench-Davis)

164S. Chilean Society through Film and Literature—(Same as Spanish 164S.) Chilean social issues and problems as represented in films and their literary sources over three decades. Important Chilean films made between 1962-1996, focusing on their intent to reflect realistically on contemporary social problems, and on their own ideological and material nature. Compares literary sources to films made from them, focusing on changes in intellectual and ideological projects that take place in transposition to another medium. Alternative modes of production with which cinema has been created in Chile. How films were made in Chile, what kind of social reality films represent in Chile, why and for what purpose films were made in Chile.

4-5 units, Aut (Ruffinelli)

165S. Contemporary Chilean Cinema—(Same as Spanish 165S.) Relevant Chilean film makers and film scholars talk about Chilean cinema from the aesthetic and social points of view, i.e., Antonio Skarmeta, Miguel Littin, Tatiana Gaviola, Silvio Caiozzi, Gonzalo Justiniano, Ricardo Larrain. (AU)

1 unit, Aut (Ruffinelli)

SPANISH LANGUAGE PROGRAM

11. Second-Year Spanish I—(Same as Spanish 11.)

5 units, Aut, Win (Staff)
12. Second-Year Spanish II—(Same as Spanish 12.)
5 units, Aut, Win (Staff)

33. Writing Tutorial
1 unit, Aut, Win (Staff)

101S. Advanced Grammar—(Same as Spanish 101S.)
5 units, Aut, Win (Staff)

PHILOSOPHY

Emeriti: (Professors): Stuart Hampshire, Georg Kreisel, David S. Nivison, Patrick Suppes, James O. Urmson
Chair: Fred Dretske
Director of Graduate Study: John Perry
Director of Undergraduate Study: Chris Bobonich
Professors: Michael Bratman (on leave), Fred Dretske, John Etchemendy (on leave), Solomon Feferman, Dagfinn Føllesdal (on leave), Grigori Mints (on leave), Julius Moravcsik, John Perry, Johan van Bentham (Spring), Thomas Wasow
Associate Professors: Philip J. Ivanhoe, Debra Satz, Kenneth Taylor
Assistant Professors: Lanier Anderson, Chris Bobonich, Rachel Cohon, Peter Godfrey-Smith, Yair Guttmann, Michael Strevens
Courtesy Professor: Denis Phillips
Consulting Associate Professors: David Israel, C. Raymond Perrault, Edward Zalta
Visiting Professors: Tyler Burge (Winter), Frank Veltman (Winter)
Visiting Associate Professor: Richard Tieszen
Visiting Assistant Professor: Jenann Ismael
Lecturers: Avrom Faderman, Stefano Franchi, Martin Gammon, Michael Green, Lori Gruen, Jon Kaplan
Acting Instructors: Alison Katsev, Crystal Thorpe

Philosophy concerns itself with fundamental problems. Some are abstract and deal with the nature of truth, justice, value, and knowledge; others are more concrete and their study may help guide our conduct or enhance our understanding of other subjects. In addition, philosophy examines the efforts of past thinkers to understand the world and our experience of it.

Although it may appear to be an assortment of different disciplines, there are features common to all philosophical enquiry. These include an emphasis on methods of reasoning and the way in which our judgments are formed, on criticizing and organizing our beliefs, and on the nature and role of fundamental concepts.

Students of almost any discipline can find something in philosophy which is relevant to their own specialties. In the sciences, it provides a framework within which the foundations and scope of a scientific theory can be studied, and it may even suggest directions for future development. Since philosophical ideas have had an important influence on human endeavors of all kinds—artistic, political, even economic—students of the humanities will find their understanding deepened by some acquaintance with philosophy.

Philosophy is an excellent major for those planning a career in law, medicine, or business. It provides analytical skills and a breadth of perspective helpful to those called upon to make decisions about their own conduct and the welfare of others. Philosophy majors who have carefully planned their undergraduate program have an excellent record of admission to professional and graduate schools.

The Special Program in the History and Philosophy of Science enables students to combine interests in science, history, and philosophy. Students interested in this program should see the special adviser.

The joint major in Philosophy and Religious Studies combines courses from both departments into a coherent theoretical pattern.

The Tanner Memorial Library of Philosophy contains an excellent working library and ideal conditions for study.

Graduate students and undergraduate majors in philosophy have formed associations for discussion of philosophical issues and reading of papers by students, faculty, and visitors. These associations elect student representatives to department meetings.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

There are two ways of majoring in philosophy: the "General Program" and the "Special Program in the History and Philosophy of Science." A student completing either of these receives an A.B. degree in Philosophy. There is also a major program offered jointly with the Department of Religious Studies. To declare a major, a student must consult with the Director of Undergraduate Study. The student is assigned an adviser to work our a coherent plan. The department strongly urges proficiency in at least one foreign language.

GENERAL PROGRAM

1. Course requirements, minimum 55 units:
   a) Preparation for the major: an introductory course (under 100) and 80.
   b) The core: 24 additional philosophy units as follows.
      1) Logic: one from 57, 159, 160A, 169
      2) Philosophy of Science: any course from 60, 61, 156, 163-168
      3) Moral and Political Philosophy: one from 170-173
4) Metaphysics and Epistemology: one from 180-188
5) History of Philosophy: two history of philosophy courses numbered 100 or above
6) One undergraduate philosophy seminar from the 194 series.
7) Electives: courses numbered 10 or above, at least 13 units of which must be in courses numbered above 99.

2. Units for Tutorial or Directed Reading (Philosophy 196, 197) may not be counted in the 55-unit requirement. No more than 10 units completed with grades of “Satisfactory” may be counted in the 55-unit requirement.
3. Transfer units must be approved by the Director of Undergraduate Studies, in writing, at the time of declaring a major. Transfer courses are strictly limited when used to satisfy major requirements.

SPECIAL PROGRAM IN HISTORY AND PHILOSOPHY OF SCIENCE
Undergraduates may major in Philosophy with a degree field in History and Philosophy of Science under the Department of Philosophy. Each participating student is assigned an adviser who approves the course of study. A total of 61 units are required for the sub-major, to be taken according to requirements 1 through 5 below. Substitutions for the listed courses are allowed only by written consent of the undergraduate adviser for History and Philosophy of Science. Students are encouraged to consider doing honors work with an emphasis on the history and philosophy of science. Interested students should see the description of the honors thesis in Philosophy and consult their advisers for further information.

1. Three science courses (for example, physics, chemistry, biology) for 12 units.
2. The following Philosophy core courses must be completed with a letter grade by the end of the junior year:
   a) one from 57, 159, 160A, 169
   b) 60
   c) 80
3. Three history of science courses.
4. Three philosophy of science courses, of which one must be Philosophy 164.
5. Three additional courses related to the major, in philosophy or history, to be agreed on by the adviser.
6. At least six courses in the major must be completed at Stanford with a letter grade. Units for Tutorial or Directed Reading (196, 197) may not be counted in the requirement. No more than 10 units completed with grades of “Satisfactory” may be counted in the requirement.
7. Transfer units must be approved in writing by the Director of Undergraduate Study at the time of declaring a major. Transfer courses are strictly limited when used to satisfy major requirements.

MINORS
A minor in Philosophy consists of at least 30 units of philosophy courses satisfying the following conditions:
1. Philosophy 5 (Area 1) may be counted for a maximum of 5 units.
2. At least 10 units must be from courses numbered 100 or above.
3. The 30 units must include a history of philosophy course from: either
   a) A history of philosophy course numbered 100 or above or
   b) Two quarters of Area 1 (only 5 of the 10 units can count towards 30 unit requirement)
4. One course from any two of the following three areas:
   a) Philosophy of science and logic: 60, 61, 156, 163-168; 57, 59, 160A, 169
   b) Moral and political philosophy: 20, 30, 170-172
   c) Metaphysics and epistemology: 10, 80, 180-188
5. Units for tutorials and directed reading may not be counted.
6. Transfer units must be approved in writing by the Director of Undergraduate Studies at the time of declaring. The number of transfer units is generally limited to a maximum of 10.
7. No more than 6 units completed with grades of “Satisfactory” count towards the 30-unit requirement.

As with the Philosophy major, these courses need not be taken in any particular order. Students must declare their intention to minor in Philosophy in a meeting with the Director of Undergraduate Studies. This formal declaration must be made no later than the last day of the quarter two quarters before degree conferral. The Permission to Declare a Philosophy Minor (signed by the Director of Undergraduate Studies) lists courses taken and to be taken to fulfill minor requirements. This permission is on file in the department office. Before graduation, a student’s record is checked to see that requirements have been fulfilled, and the results are reported to the University Registrar.

HONORS PROGRAM
Students who wish to undertake a more intensive and extensive program of study, including seminars and independent work, are invited to apply for the honors program during Winter Quarter of the junior year. Admission is selective on the basis of grade point average (GPA), demonstrated ability in philosophy, and progress towards satisfying the requirements of the major.
With their application, candidates should submit an intended plan of study for the remainder of the junior year and the senior year. It should include at least 5 units of Senior Tutorial (196) during Autumn and/or Winter Quarters of the senior year. In the quarter preceding the tutorial, students should submit an essay proposal to the Philosophy undergraduate director and determine an adviser.

In the senior tutorial, students write an essay on some philosophical problem. This essay is usually about 7,500 words for those taking one quarter of the tutorial, and about 12,500 for those taking two quarters of the tutorial. Length may vary considerably depending on the problem and the approach. The tutorial essay may use work in previous seminars and courses as a starting point.

A completed draft of the essay is submitted to the adviser at the end of the Winter Quarter. If rewriting is necessary, the student may enroll in 2 units of the Spring Quarter senior tutorial. Three copies of the essay must be given to the department by the end of the fifth full week of the Spring Quarter.

The honors tutorials represent units in addition to the 55-unit requirement.

The Department of Philosophy cooperates with the honors component of the "Humanities Special Program" as described in that section of this bulletin.

JOINT MAJOR IN PHILOSOPHY AND RELIGIOUS STUDIES

The joint major in Philosophy and Religious Studies consists of 60 units of course work with approximately one third each in the philosophy core, the religious studies core, and either the general major or the special concentration.

No courses in either the philosophy or religious studies core may be taken Satisfactory/No Credit.

In general, transfer units cannot be used to satisfy the core requirements. Transfer units and substitutions must be approved by the director of undergraduate studies in the appropriate department.

CORE REQUIREMENTS

1. Philosophy courses:
   a) 80
   b) 16 units, including at least one Philosophy course from each of the following areas:
      1) Logic and philosophy of science: 57, 60, 61, 156, 159, 160A, 162-169
      2) Ethics and value theory: 170-173
      3) Epistemology, metaphysics, and philosophy of language: 180-188
      4) History of philosophy: 100-103

2. Religious Studies courses: 20 units, including at least two courses in diverse religious traditions (for example, an Eastern and a Western or a literate and a preliterate tradition) and including at least one seminar.

   General Major Requirements—Five additional courses (approximately 20 units) divided between the two departments. No more than 5 of these units may come from courses numbered under 99 in either department. Each student must also take at least one undergraduate seminar in religious studies and one undergraduate seminar in philosophy.

   Special Concentration—With the aid of an adviser, students pursue a specialized form of inquiry in which the combined departments have strength; for example, American philosophy and religious thought, philosophical and religious theories of human nature and action, philosophy of religion. Courses for this concentration must be approved in writing by the adviser.

DIRECTED READING AND SATISFACTORY/NO CREDIT UNITS—Units of directed reading for fulfilling requirements of the joint major are allowed only with special permission. No more than 10 units of work with a grade of “Satisfactory” count toward the joint major.

HONORS PROGRAM

Students pursuing a joint major in Philosophy and Religious Studies may also apply for honors by following the procedure for honors in either of the departments.

COTERMINAL DEGREE

It is possible to earn an A.M. in Philosophy while earning an A.B. or B.S. This can usually be done by the end of the fifth undergraduate year, although students whose degree is not in philosophy may require an additional year. Standards for admission to, and completion of, this program are the same as for A.M. applicants who already have the bachelor’s degree when matriculating. Applicants for the coterminal program are not, however, required to take the Graduate Record Exam. Information about application is available from Degree Progress in Registrar’s Office.

GRADUATE PROGRAMS

The department is prepared to direct and supervise individual study and research to supplement instruction offered in courses listed below. In addition, advanced seminars unlisted in the catalog are frequently organized in response to student interest. Candidates for advanced degrees are urged to discuss their entire program of study with their department advisers as early as possible.

Applications to graduate programs in the Department of Philosophy can be obtained from Graduate Admissions, the Registrar’s Office. Applicants must take the Graduate Record Examination by October of the year the application is submitted.
**MASTER OF ARTS**

Two programs lead to the A.M. in Philosophy. One is a general program providing a grounding in all branches of the subject. The other provides special training in one branch. A suitably qualified applicant may arrange a specialized program in any subject, analogous to those in the philosophy of science or philosophy of language described below, provided that the department offers sufficiently intensive teaching in the special subject.

Admissions—All prospective master’s students, including those currently enrolled in other Stanford programs, must apply for admission to the program. The application deadline is April 1 of the academic year preceding entry into the program. In exceptional circumstances, consideration may be given to applications received after the April 1 deadline but before April 30. No fellowships are available. Entering students must meet with the director of the master’s program and have their advisers’ approval, in writing, of program proposals. The master’s program should not be considered a stepping-stone to the doctoral program; these two programs are separate and distinct.

Unit Requirements—Each program requires a minimum of 36 units in philosophy, though students in a special program may be allowed or required to replace up to 9 units of philosophy by 9 units in the field of specialization. Although the requirements for the A.M. are designed so that a student with the equivalent of a strong undergraduate philosophy major at Stanford might complete them in one year, most students need longer. Students should also keep in mind that although 36 units is the minimum required by the University, quite often more units are necessary to complete department requirements. Up to 6 units of directed reading in philosophy may be allowed. There is no thesis requirement, but an optional master’s thesis or project, upon faculty approval, may count as the equivalent of up to 8 units. A special program may require knowledge of a foreign language. At least 36 units must be completed with an GPA of “B-” or better at Stanford. Students are reminded of the University requirements for advanced degrees, and particularly of the fact that for the A.M., students must complete three full quarters as measured by tuition payment.

**GENERAL PROGRAM**

The General Program requires a minimum of 36 units in Philosophy courses numbered above 99. Courses taken to satisfy the “undergraduate core” may not be counted in the 36 units. The requirement has three parts:

1. **Undergraduate Core:** students must have when they enter, or complete early in their program, the following undergraduate courses. (Students entering from other institutions should establish equivalent requirements with a master’s adviser upon arrival or earlier):
   a) Logic 57, 159, or 160A
   b) Philosophy of science: any course from 60, 61, 163-168
   c) Moral and political philosophy: one from 170-173.
   d) Metaphysics and epistemology: one from 180-188
   e) History of philosophy: two history of philosophy courses numbered 100 or above

2. **Graduate Core:** students must take at least one course numbered over 105 from three of the following five areas (courses used to satisfy the undergraduate core cannot also be counted toward satisfaction of the graduate core). Cross-listed and other courses taught outside the Department of Philosophy do not count towards satisfaction of the core.
   a) Logic and semantics
   b) Philosophy of science and history of science
   c) Ethics, value theory, and moral and political philosophy
   d) Metaphysics, epistemology, and philosophy of language
   e) History of philosophy

   Each master’s candidate must take at least two courses numbered above 200. One may be a graduate core seminar (260, 270, 280, 281), but no student is admitted to a core seminar before completing undergraduate requirements in the area of the seminar and securing the approval of the instructor.

3. **Specialization:** students must take at least three courses numbered over 105 in one of the five areas.

**SPECIAL PROGRAM IN THE HISTORY AND/OR PHILOSOPHY OF SCIENCE**

Only students with substantial preparation in philosophy or in the history of science in one of the natural or social sciences are admitted. Entering students whose primary preparation has been in science may be required to satisfy all or part of the undergraduate core requirement as described in the General Program. Students whose preparation has not been in science may be required to take additional science courses.

**COURSE REQUIREMENTS**

1. At least four courses in the Department of Philosophy in the history or philosophy of science. At least two of these must be graduate-level courses, or graduate sections of undergraduate courses, and at least one of the four must be in the philosophy of science and one in the history of science.

2. In most cases, one upper division or graduate course outside the Department of Philosophy in the natural or social sciences or in history.
3. Remaining courses are to be chosen in consultation with and approved by an adviser.

SPECIAL PROGRAM IN SYMBOLIC SYSTEMS

Students should have the equivalent of the Stanford undergraduate major in Symbolic Systems. Students who have a strong major in one of the basic SSP disciplines (philosophy, psychology, linguistics, computer science) may be admitted but are required to do a substantial part of the undergraduate SSP core in each of the other basic SSP fields. This must include the following three philosophy courses or their equivalents: 80; 160A; and one from 181, 183, 184, 186. This work does not count towards the 36-unit requirement.

COURSE REQUIREMENTS
1. Four courses in philosophy at the graduate level, including courses from three of the following five areas:
   a) Philosophy of language
   b) Logic
   c) Philosophy of mind
   d) Metaphysics and epistemology
   e) Philosophy of science

   At most two of the four courses may be graduate sections of undergraduate courses numbered 100 or higher.

2. Three courses numbered 100 or higher from outside Philosophy, chosen in consultation with an adviser. These courses should be from two of the following four areas:
   a) Psychology
   b) Linguistics
   c) Computer Science
   d) Education

   Remaining courses are to be chosen in consultation with and approved by an adviser.

SPECIAL PROGRAM IN THE PHILOSOPHY OF LANGUAGE

Admission is limited to students with substantial preparation in philosophy or linguistics. Those whose primary preparation has been in linguistics may be required to satisfy all or part of the undergraduate core requirements as described in the General Program. Those whose preparation is primarily in philosophy may be required to take additional courses in linguistics.

COURSE REQUIREMENTS
1. Philosophy of language: two approved courses in the philosophy of language numbered 180 or higher.
3. Logic: at least two approved courses numbered 160A or higher.
4. An approved graduate-level course in mathematical linguistics or automata theory.

DOCTOR OF PHILOSOPHY

The University's basic requirements for the Ph.D. degree (residence, dissertation, examination, and so on) are discussed in the "Graduate Degrees" section of this bulletin. The requirements detailed here are department requirements. There are six basic areas (Philosophy of Science, Ethics, Metaphysics and Epistemology, Philosophy of Language, Logic, and History) in which students should have proficiency in order to obtain a Ph.D. Demonstrating proficiency takes the form of course work, intensive seminars, and papers, as detailed below.

Students must have completed this work by the end of their second year and all courses must be passed with a grade point average (GPA) of 'B-' or better (no Satisfactory/No Credit) to be advanced to candidacy.

At the end of the first year, the department reviews the progress of each first-year student to determine whether the student may continue in the program.

Any student in one of the Ph.D. programs may apply for the A.M. when all University and department requirements have been met.

PROFICIENCY REQUIREMENTS
1. Course requirements, to be completed during the first two years:
   a) Seven of the eight items listed below:
      1) Four "core" graduate courses and seminars in philosophy of language (281); philosophy of mind, metaphysics, and epistemology (280); value theory (270); and philosophy of science (260). To enroll, the student must be a Ph.D. student in Philosophy or have special permission of the instructor.
      b) Philosophy 159 or the equivalent.
      c) Breadth requirement: a course in Eastern or Continental philosophy, or some other course establishing breadth.
      d) A total of at least 39 units of course work in the Department of Philosophy, numbered above 110 but not including Teaching Methods (Philosophy 239). Units of Individual Directed Reading (Philosophy 240) may be included only with the explicit approval of the Director of Graduate Studies.
   b) Philosophy 160A
   b) Philosophy 159 or the equivalent.
   c) Breadth requirement: a course in Eastern or Continental philosophy, or some other course establishing breadth.
   d) A total of at least 39 units of course work in the Department of Philosophy, numbered above 110 but not including Teaching Methods (Philosophy 239). Units of Individual Directed Reading (Philosophy 240) may be included only with the explicit approval of the Director of Graduate Studies.
2. Teaching assistance: a minimum of four quarters of teaching assistance at 25 percent time, usually during the second and third years.
3. Candidacy: to continue in the Ph.D. program, each student must be approved for candidacy during the sixth academic quarter (normally the Spring Quarter of the student's second year). Students may be approved for candidacy on a conditional basis if they have only one or two outstanding deficiencies, but are not officially advanced to candidacy until these deficiencies have been removed. Approval for candidacy indicates that in the department's judgment the student can successfully complete the Ph.D. In reaching this judgment, the department considers the overall quality of the student's work during the first six quarters and the student's success in fulfilling course requirements.

4. During the third year of graduate study, and after advancement to candidacy, a Ph.D. student should successfully complete at least three graduate-level courses/seminars, at least two of which must be in philosophy. Courses required for candidacy are not counted toward satisfaction of this requirement. Choice of courses/seminars outside philosophy is determined in consultation with a student's adviser.

5. During the summer of their second year, students are eligible to attend a Dissertation Development seminar given by the department.

6. Dissertation work and defense: the third and fourth (and sometimes fifth) years are devoted to dissertation work.

a) Dissertation Proposal: By Spring Quarter of the third year, students select a dissertation topic, a reading committee, and some possible thesis relative to that topic. The topic and thesis should be sketched in a proposal of three to five pages, plus an annotated bibliography indicating familiarity with the relevant literature. The proposal should be approved by the reading committee before the meeting on graduate student progress late in Spring Quarter.

b) Departmental Oral: During Autumn Quarter of the fourth year, students take an oral examination, called the "Departmental Oral," based on at least 30 pages of written work, in addition to the proposal. The aim of the exam is to help the student arrive at an acceptable plan for the dissertation and to make sure that the student, thesis, topic, and adviser make a reasonable fit. In cases where such an exam is deemed inappropriate by the reading committee, the student may be exempted by filing a petition with the Director of Graduate Studies, signed by the student and the members of the reading committee.

c) Fourth-Year Colloquium: No later than the Spring Quarter of the fourth year, students present a research paper in a seminar open to the entire department. This paper should be on an aspect of the student's dissertation research.

d) University Oral Exam: Once a draft of the dissertation has been essentially completed, there is a second exam, called the "University Oral Exam." A portion of it consists of a student presentation based on the dissertation and is open to the public. A closed question period follows. If the draft is ready by Autumn Quarter of the fourth year, the student can request that the University oral count as the department oral.

SPECIAL GRADUATE PROGRAMS

The department recognizes that some students may need to spend a large amount of time preparing themselves in some other discipline related to their philosophical goals, or in advanced preparation in some area within philosophy. In such circumstances, the department is willing to waive some of the Ph.D. requirements. Such an exemption is not automatic; a program must be worked out with an adviser and submitted to the department some time in the student's first year. This proposal must be in writing and must include:

1. The areas to be exempted (see below).
2. A program of additional courses and seminars in the special area (usually at least 12 units).
3. A justification of the program that considers both intellectual coherence and the student's goals.

The department believes there is plenty of room for normal specialization within the program as it stands, and that all students will specialize to some extent. Thus, the intent is not to exempt courses on a one-to-one basis, but only to grant exemptions when a student plans an extensive and intensive study of some relevant area.

Special-program students may be exempted from two of the following:

1. One additional item from the items listed above in requirement 1(a)
2. Philosophy 159 (but then they must take Philosophy 57)
3. The breadth requirement

If a student's special program involves substantial course work outside of philosophy then, with the approval of the adviser, the student may petition the department to reduce requirement 1(d) (the Philosophy unit requirement for the first two years). Normally this requirement is not reduced below 32 units.

Ph.D. MINOR

To obtain a Ph.D. minor in Philosophy, students must follow these procedures:

1. Consult with the Director of Graduate Studies to establish eligibility, and select a suitable adviser.
2. Give to the department academic assistant a signed copy of the program of study (designed with the adviser) which offers:
   a) 30 units of courses in the Department of Philosophy with a GPA of 'B-' or better. No more than 3 units of directed reading may be counted in the 30-unit requirement.
   b) At least one course or seminar numbered over 99 to be taken in each of these five areas:
      1) Logic
      2) Philosophy of science
      3) Ethics, value, theory, and moral and political philosophy
      4) Metaphysics, epistemology, and philosophy of language
      5) History of philosophy
   c) Two additional courses numbered over 199 to be taken in one of those (b) five areas.

3. A faculty member from the Department of Philosophy (usually the student's adviser) serves on the student's doctoral oral examination committee and may request that up to one third of this examination be devoted to the minor subject.

4. Paperwork for the minor must be submitted to the department office before beginning the program.

INTERDEPARTMENTAL PROGRAMS

GRADUATE PROGRAM IN HUMANITIES

The Department of Philosophy also participates in the Graduate Program in Humanities leading to the joint Ph.D. degree in Philosophy and Humanities. It is described in the "Humanities Special Programs" section of this bulletin.

GRADUATE PROGRAM IN COGNITIVE SCIENCE

Philosophy participates with the departments of Computer Science, Linguistics, and Psychology in an interdisciplinary program in Cognitive Science. It is intended to provide an interdisciplinary education as well as a deeper concentration in philosophy and is open to doctoral students. Students who complete the requirement within Philosophy and the Cognitive Science requirements receive a special designation in Cognitive Science along with the Ph.D. in Philosophy. To receive this field designation, students must complete 30 units of approved courses, 18 of which must be taken in two disciplines outside of philosophy. The list of approved courses can be obtained from the Cognitive Science program located in the Department of Psychology.

SPECIAL TRACK IN PHILOSOPHY AND SYMBOLIC SYSTEMS

Students interested in interdisciplinary work relating philosophy to artificial intelligence, cognitive science, computer science, linguistics, or logic may pursue a degree in this program.

Prerequisites—Ideally, admitted students have covered the equivalent of the core of the undergraduate Symbolic Systems Program requirements as described in that section of this bulletin, including courses in philosophy, logic, artificial intelligence (AI), cognitive science, and linguistics. The graduate program is designed with this background in mind. Students missing part of this background may need additional course work. Aside from the required course work below, the Ph.D. requirements are the same as for the regular program.

Courses of Study—The program consists of two years of courses and two years of dissertation work. Students are required to take the following courses in the first two years:

1. Six Philosophy courses:
   a) Two of the following: 260, 270, 280, 281
   b) One course in the history of modern philosophy
   c) Two quarters of graduate logic courses from among 290A, 291A, 292A, 293A
   d) At least one additional seminar in the general area of symbolic systems: that is, Philosophy 296, 382, 395, and so on

2. Five cognitive science and computer science courses:
   a) At least two courses in cognitive psychology
   b) Two or three graduate courses in computer science, at least one in AI and one in theory

3. Three linguistics and computational linguistics courses:
   a) Graduate courses on natural language that focus on two of the following areas: phonetics and phonology, syntax, semantics, or pragmatics
   b) One graduate course in computational linguistics, typically Linguistics 239

4. At least two additional graduate seminars at a more advanced level, in the general area of the program, independent of department. These would typically be in the area of the student's proposed dissertation project.

The requirements for the third year are the same as for other third-year graduate students in philosophy: a dissertation proposal, creation of a dissertation committee, and at least three approved graduate courses and seminars. The dissertation committee must include at least one member of the Department of Philosophy and one member of the Program in Symbolic Systems outside the Department of Philosophy.

The requirement for the fourth year is the same as for the other graduate students in philosophy: a department oral on an initial draft of part of the dissertation, and a University oral exam when the dissertation is essentially complete.
GRADUATE FELLOWSHIPS AND ASSISTANTSHIPS

A limited amount of fellowship support is available for Ph.D. students in philosophy. Students request aid by checking the appropriate box on the application form. Details of this program may be obtained from the department. Note that a condition of financial aid may be teaching assistance that goes beyond the Ph.D. requirement.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

See the quarterly Time Schedule for revised listings.

INTRODUCTORY

These acquaint the student with some of the most important problems, positions, and methods in philosophy. Some are designed to give general preparation for further work in philosophy. Some apply the philosopher's approach to particular problems and subjects encountered in other areas of study. Courses 5A,B,C form an Area 1 sequence, sponsored by the Department of Philosophy as part of the Area One Program. Any one of 5A,B,C may count as the introductory philosophy course requirement for the major.

5A. Cultures, Ideas, and Values: Philosophy and Human Existence, Classical Foundations—Recommended for entering students. Orientation to philosophic argument and themes. The origins of philosophical thought are traced in the Greek classical and Judeo-Christian periods, and situated within other forms of understanding. The nature of human beings, of morality, and of the world. Readings: Homer, Plato, the Bible, Aristotle, and a Greek drama. GER:1 (DR:1) (three-quarter sequence)

5 units, Aut (Staff)

10. God, Self, and the World—The basic problems of philosophy are investigated through a reading of ancient and early modern texts: the nature of knowledge and of the world, the existence of god, the legitimacy of the state, the meaning of life, etc. GER:3a (DR:8)

5 units, Aut (Strevens)

12N. Stanford Introductory Seminar—Happiness, Death, and Meaning of Life—Preference to freshmen. What makes life meaningful? What makes it happy and what is the relation between the two? Implications of death for meaningfulness and happiness. GER:3a (DR:8)

3 units, Win (Bobonich)

14N. Stanford Introductory Seminar—Ethical Status of Non-Human Animals—(Same as Religious Studies 9N.) Preference to freshmen. Exploration of a range of western philosophical views, classical and modern, concerning the ethical status of non-human animals. Focus is on a few standard ethical theories, e.g., utilitarianism and inalienable rights, and the plausibility of extending these theories to non-human animals. GER:3a (DR:8)

3 units, Spr (Ivanhoe)


5 units, Spr (Cohon)

30. Introduction to Political Philosophy—(Same as Public Policy 103A.) Concepts of equality, justice, tolerance, liberty, utility, authority, and rights are approached through major works in political philosophy. Each work presents a distinct and systematic conception of human nature and the social and economic conditions of a just association which...
expresses that nature. Readings: Hobbes, Locke, Mill, Marx, Rawls. GER:3a (DR:8)
5 units, Aut (Gruen)

46. Introduction to Chinese Thought—(Same as 104, Religious Studies 55.) Religious and philosophical thought of early China, especially the "Classical" period, 550-200 B.C. Development of Chinese thought as an extended dialogue among thinkers who provided uncommon and often contradictory answers to a common set of problems. Limited enrollment.
4 units (Ivanhoe) not given 1997-98

57. Logic, Reasoning, and Argumentation—Study of propositional and predicate logic, emphasizing translating English sentences into logical symbols and constructing derivations of valid arguments. GER:2c (DR:4)
5 units, Spr (Faderman)

60. Introduction to the History and Philosophy of Science—(Same as History and Philosophy of Science 60.) Survey of 20th-century views on the nature of scientific knowledge. Logical positivism and Popper; the problem of induction; Kuhn, Feyerabend and radical philosophies of science; subsequent attempts to rebuild moderate empiricist and realist positions; case study in the history of biology. GER:3a (DR:8)
5 units, Aut (Godfrey-Smith)

61. Introduction to Philosophy of Social Science—(Same as Education 111.) For upper-division undergraduates majoring in social sciences, and for beginning graduate students in related areas such as education. Focuses on the difference writers have noted between the natural and social sciences, and on attacks on the ideal of a "naturalistic" social science. Topics: explaining human action, the functional explanation of social phenomena, and holistic vs. reductionist orientations. Examples for contemporary social science (and especially educational) research literature.
3 units (Phillips) not given 1997-98

3 units, Spr (Ivanhoe)

77. The Ethics of Social Decisions—(Same as Ethics in Society 77.) Application of moral reasoning to a particular social or political view. Topic this year is environmental justice.
4 units, Win (Gruen)

78. Medical Ethics—Introduction to moral reasoning and its application to problems in medicine: the morality of killing, the distribution of medical resources, and the use of radical categories in medical science.
4 units, Spr (Green)

80. Mind, Matter, and Meaning—Intensive survey of some central and perennial topics in philosophy: free will and determinism, the mind-body problem, and personal identity. Prerequisite: one course in philosophy other than logic. GER:3a (DR:8) (WIM)
5 units, Win (Taylor)

3 units, Spr (Cox)

HISTORY OF PHILOSOPHY

100-103 are surveys of some of the most important figures and movements in Western philosophy. Other courses cover particular periods, movements, and figures in the history of Eastern and Western philosophy. Prospective philosophy majors should take as many as possible during the sophomore year.

100. Greek Philosophy—Greek philosophic thought from the pre-Socratics through Plato and Aristotle to the Hellenistic schools (the Epicureans, the Stoics, and the Skeptics). Topics: virtue and happiness, the nature of the soul, theories of perception, knowledge, and reality. GER:3a (DR:8)
4 units, Aut (Bobonich)


102. Modern Philosophy, Descartes to Kant—Issues in the theoretical philosophies of Descartes, Berkeley, Hume, and Kant. Topics: questions of realism and idealism, the scope and limits of the human intellect, the idea of a "science of the mind," the status of metaphysical concepts like substance and cause, and the relation of philosophy to the "new science" that emerged in the 17th century. GER:3a (DR:8)
4 units, Win (Anderson)

103. 19th-Century Philosophy—Introduction to the major thinkers and problems of European philosophy in the 19th century. Interpretation of works by Kant, Hegel, Marx, and Nietzsche, focusing on philosophy of history, responses to Kantianism, the prospects for a scientific philosophy, the possibilities for and character of a philosophical system, and the value of particular historical and cultural formations (e.g., capitalist economy, Christianity).
4 units (Anderson) not given 1997-98

104. Introduction to Chinese Thought—(Same as 46.) For Philosophy majors.

106. Greek Love and Queer Theory—(Same as Feminist Studies 114.)
3 units, Spr (Kaplan)

113/213. Zhuang Zi—(Graduate students register for 213; same as Religious Studies 113.) His-
129/229. Pragmatism—(Graduate students register for 229.) Introduction to Pierce, James, Dewey, and some recent writers such as Rorty. Focus is on questions of truth, belief, knowledge, and the nature of philosophical inquiry. 
4 units, Win (Godfrey-Smith)

131/231. The Structure of Cognition: Introduction to Husserl’s Phenomenology—(Graduate students register for 231.) Its background and basic concepts. Emphasis is on the concept of intentionality, and its role in Husserl’s theory and in contemporary philosophical debates.
4 units, Spr (Tieszen)

132/232. Existentialism—(Graduate students register for 232.) Exploration of central existentialist questions (e.g., what constitutes authentic individuality? what is our relation to the divine? how can one live a meaningful life? what is the significance of death?) through the existentialist preoccupation with human freedom. Rethinking of the traditional problem of freedom and determinism in readings from Rousseau, Kierkegaard, and Nietzsche, and the extension of these ideas by Sartre, Beauvoir, and Camus, including their social and political consequences in light of 20th-century fascism and feminism.
4 units (Anderson) not given 1997-98

133/233. Hermeneutics and Critical Theory—(Graduate students register for 233.) Introduction to two of the most important and influential schools in 20th-century German philosophy through the leading representatives of these schools: Heidegger, Gadamer, Horkheimer, and Habermas.
4 units, not given 1997-98

HISTORY OF SCIENCE

138A, B, C. Introduction to Cosmology—(Same as History and Philosophy of Science 138A, B, C.) Three-quarter sequence on the history of the exact sciences, emphasizing cosmology. Technical aspects of the classical theories (Ptolemaic and Copernican), including mathematics, astronomy, physics, and chemical theory, together with speculative aspects in natural philosophy and theology.

138A. Ancient Period
4 units, not given 1997-98

138B. Cosmology: Middle Ages and the Renaissance
4 units, not given 1997-98

138C. Modern Period: Newton to Einstein
4 units, not given 1997-98

140. Topics in the History of Mathematics: From Antiquity to the 17th Century—(Same as History and Philosophy of Science 140.) Origins and development of concepts and techniques in their social and philosophical context. Emphasis is on ancient Greek geometry, its adoption of the idea of proof and interaction with early philosophy, its
application in optics and mechanics, its significance and limitations.

4 units, not given 1997-98

LOGIC AND PHILOSOPHY OF SCIENCE

155. Concepts of Freedom—Historical and current concepts of freedom. The views of Hume, Kant, Mill, A. V. Dicey, and Hayek; recent work, including economic concepts of freedom.

4 units (Riddlesdal, Suppes) not given 1997-98

156. Popper, Kuhn, and Lakatos—(Same as Education 214X.) Popper, Kuhn, and Lakatos are 20th-century philosophers of science who raised fundamental issues while dealing with the nature of scientific progress: the rationality of change of scientific belief, science vs. non-science, role of induction in science, truth or verisimilitude as regulative ideals. Their impact in the natural and social sciences and applied areas such as educational research.

3 units (Phillips) not given 1997-98

159. Basic Concepts in Mathematical Logic—Concepts and techniques used in mathematical logic, primarily through the study of the language of first-order logic. Topics: formalization, proof, propositional logic, quantifiers, sets, mathematical induction, and enumerability. GER:2c (DR:4)

4 units, Aut (Faderman)

160A. First-Order Logic—Syntax and semantics of sentential and first-order logic. Introduction to basic concepts of model theory. Gödel's Completeness Theorem and its consequences: the Löenheim-Skolem Theorem and the Compactness Theorem. Prerequisite: 159 or consent of instructor.

4 units, Win (Veltman)

160B. Computability and Logic—Different approaches to effective computation: recursive functions, register machines, and various programming styles. Proof of their equivalence, discussion of Church's Thesis. Development of some elementary recursion theory. These techniques are used to prove Gödel's Incompleteness Theorem for arithmetic, whose technical and philosophical repercussions are surveyed. Prerequisite: 160A.

4 units, Spr (Feferman)

162. Philosophy of Mathematics—Introduction to 20th-century approaches to the foundations and philosophy of mathematics. Background in mathematics, set theory, and logic. The schools and programs of logicism, predicativism, platonism, formalism, and constructivism. Readings from leading thinkers. Prerequisites: 160A, 161, or consent of the instructor.

4 units, not given 1997-98

163. Philosophy of Statistics—Introduction to and definition of the concept of probability in a philosophically motivated fashion. Emphasis is on the use of probabilities for decision-making under uncertainty.

4 units (Guttmann) not given 1997-98

164/264. Central Topics in the Philosophy of Science—(Graduate students register for 264.) The empiricist, post-empiricist, and pragmatic accounts of scientific explanation, emphasizing the role these accounts play in the empiricist and post-empiricist conceptions of the nature of science. Topics: probabilistic explanation, explanation using cet-eris paribus laws, functional explanation in biology, and interlevel explanation (where one theory explains another theory at a higher level of description).

4 units, Spr (Strevens)

165/265. Philosophy of Physics—(Graduate students register for 265.) Methodological and philosophical issues in modern physics.

4 units, not given 1997-98

167/267. Philosophy of Biology—(Graduate students register for 267.) Questions about explanation and theory construction in evolutionary biology. Analysis of key concepts: adaptation, fitness, function, units of selection, species.

4 units, Aut (Godfrey-Smith)

168/268. Philosophy of Logic—(Graduate students register for 268.) The liar's paradox has been taken as evidence that something is wrong with our ordinary concept of truth, or at least with a naive analysis of that concept. Partly in response to the liar's paradox and its cousins, philosophical logicians have proposed formal theories of truth. The classic work of Tarski, and the last two decades (Kripke, Gupta and Belnap, McGee, Barwise and Etchemendy, Grover, etc.). Prerequisite: competence in logic at the level of 159.

3 units, Win (Feferman)

169. Intensional Logic—Logical analysis of intensional notions like modality, time, conditionals, knowledge, and action, starting from their philosophical background. Development of the basic model theory and proof theory of Modal Logic (possible worlds semantics). Transition to newer developments in philosophy, linguistics, and computer science.

4 units, Spr (van Benthem)

ETHICS, AESTHETICS, AND SOCIAL AND POLITICAL PHILOSOPHY

170. Ethical Theories—What sort of conduct is right and what sort of person is a good person? Is it irrational to be immoral? What is the connection between morality and human nature? Morality and human emotion? Are moral duties a matter of social invention? Readings from influential 17th- and 18th-century moral thinkers (the moral sense and sentiment schools, the self-interest school.
moral rationalists, utilitarians) and some of their followers today.

4 units, Spr (Cohon)

171. Political Philosophy—Liberalism and its critics. Individual and group rights. The ability of liberal political theory to respond to its critics’ attacks on its methodological and psychological foundations and on its core values.

4 units, Spr (Gruen)

172/272. Is Morality too Demanding—(Graduate students register for 272.) Exploration of one of the most damning criticisms of moral theories, that they demand too much. Critics have argued that prominent moral theories require moral agents to act in ways that are either impossible or, if possible, undesirable. Can these theories capture the value of acting with integrity? Do they require agents to act as saints? Do they alienate agents from their personal projects and relationships? Do they contain an overly strenuous commitment to impartiality?

4 units, Win (Gruen)

173. Philosophy of Literature—The themes of friendship, loyalty, and overcoming resentment in four dramas spanning 2,400 years.

4 units, Win (Moravcsik)

174. International Justice—Most normative thought about politics is concerned with the internal affairs of societies. The justification for focusing on societies, as opposed to the world as a whole, and the problems of extending ideas of political morality from the social to the international level.

4 units, Aut (Green)

175. Feminist Practical Ethics—Over the last two decades feminist philosophers and political theorists have been developing and refining a variety of feminist approaches to public policy issues. The controversies that have emerged between feminists over affirmative action, reproductive technologies, pornography and sex work, militarism, the environment, and other issues of contemporary social concern.

4 units, Aut (Gruen)

176. Aesthetics—Philosophical examination of the concepts of beauty and art, and theories concerning appropriate response. Ancient and modern proposals.

4 units (Guttmann) not given 1997-98

177. Philosophical Issues Concerning Race and Racism—Concepts of race, race consciousness and racism, and their connections. What is “race” and what is its role in racism? How should we view ethnic and racial identities if we wish to secure the conditions in which humanity can be viewed as a single moral community whose members have equal respect? What laws, values, and institutions best embody the balance between the competing goals of group loyalty, opposition to racism, and common humanity? Philosophical writings on freedom and equality, human rights, pluralism, and affirmative action. Historical accounts of group exclusion and various explanations.

4 units, Win (Satz)

178. Ethics in Society Honors Seminar—(Same as Ethics in Society 190.) Interdisciplinary. Students present issues of public and personal morality, topics chosen with the advice of the instructor. Student-prepared reading lists are available a week prior to the presentation. Group discussion follows.

3 units, Spr (Okin)

179. Philosophy of Friendship

4 units (Moravcsik) not given 1997-98

EPistemology, Metaphysics, Philosophy of Mind, and Philosophy of Language

181. Philosophy of Language—Notions of meaning, reference, and language use; with relations to psycholinguistics and formal semantics. Prerequisites: 80 and some background in logic.

4 units, Spr (Taylor)


4 units, Win (Moravcsik)

183/283. Meaning and Experience—(Graduate students register for 283.) Interrelationships between meaning and experience, emphasizing how our judgments concerning meaning may be based on empirical evidence. Philosophers: W. V. Quine and Donald Davidson. Prerequisite: 80 or consent of instructor. Recommended: some acquaintance with the philosophy of language.

4 units (Føllesdal) not given 1997-98

184. Theory of Knowledge—Some central problems of epistemology, including the analysis of knowledge and memory, the nature of perception, and an evaluation of skepticism. Prerequisite: 80 or consent of instructor.

4 units, Win (Strevens)

186. Philosophy of Mind—The mind-body problem, including behaviorism, functionalism, and other forms of materialism; intentionality and the nature of mental representation; the explanation of action in terms of the agent’s reasons. Prerequisite: 80 or consent of instructor.

4 units, not given 1997-98

187/287. Philosophy of Action: Problems of Agency—Recent discussions of agency, intention,
188. Personal Identity—People seem to remain the same despite the various changes they undergo during their lives. Why? The answer can profoundly influence one’s beliefs about whether people are essentially bodies or minds, and whether one’s own survival matters. Readings: John Locke, Thomas Reid, David Hume, Terence Penelhum, Bernard Williams, and Derek Parfit.

4 units, Win (Green)

194. Undergraduate Seminars in Philosophy—Preference given to undergraduate majors. A series for advanced undergraduates. Enrollment limited to 14. For those in the Philosophy honors program, seminars serve as preparation for writing an honors thesis.

194A. The Direction of Time—Is time travel a conceptual possibility? Is it a physical possibility? Can an effect precede its cause? Why does the future depend on the past but not vice versa? Are the laws of nature asymmetric with respect to reflection in time, and if not, why do the temporal reversals of the bulk of everyday physical processes (e.g., the spreading of a drop of milk through a cup of coffee or the shattering of a porcelain teacup) never occur? How does our knowledge of the past differ from our knowledge of the future, and why?

4 units, Win (Ismael)

194B. Philosophy of Law—Core issues in the philosophy of law. Do we have an obligation to obey the law? How does law differ from other forms of social coercion? Is the imposition of punishment ever justified? Fairness and equality. Readings in philosophy, legal theory, and judicial decisions.

4 units, Spr (Blake, McLeod)

195. Undergraduate Reading Groups in Philosophy—Preference given to undergraduate majors. Advanced, intensive reading groups. Enrollment limited to five.

not given 1997-98

196. Tutorial—Senior Year
5 units, any quarter (Staff)

197. Individual Work for Undergraduates
any quarter (Staff)

198. The Dualist—Dedicated to the publication and promotion of The Dualist, a national journal of undergraduate work in philosophy. Requires neither papers nor presentations; students take the initiative in an informal atmosphere. May be taken one to three quarters. (AU)

1 unit, any quarter (Staff)

211. Nivison and his Critics—(Same as Religious Studies 211.) The philosophical work of David S. Nivison, reading his own works and those which influenced his approach, some recent criticisms, and his responses to these.

4 units (Ivanhoe) not given 1997-98

212. Interpreting Confucian Texts—(Same as Religious Studies 212.) Illustrates the critical importance of historical and philosophical issues to the task of interpretation. Introduction to Chinese commentarial tradition. Seminar, pace and range determined by constituents. Prerequisite: consent of instructor.

5 units, Aut (Ivanhoe)

217. Graduate Seminar on Greek Philosophy: Aristotle—Aristotle’s ethical theory and, in particular, the Eudemian Ethics. Related aspects of Aristotle’s psychology and political theory.

3 units, Spr (Bobonich)

219. Graduate Seminar on Greek Philosophy: Plato

3 units, Aut (Moravcsik)

226. Kant’s System of Reason—The role of the faculty of reason in Kant’s theoretical philosophy. The limits Kant places on the use of this faculty, and the positive “regulative” use of the Ideas of Reason in philosophy and other sciences. Emphasis is on the ideal of systematicity in Kant’s thought. Readings from the Critique of Pure Reason, the Critique of Judgment, other works of Kant, and secondary literature.

3 units, Win (Anderson)

236. Nietzsche—Nietzsche’s later works, questions of the structure of these books, and what that structure can teach us about what kind of philosopher Nietzsche was. Interpretation of the central doctrines of Nietzsche’s thought (perspectivism, the will to power, eternal recurrence) and Nietzsche’s vision of the good life for human beings. Some secondary literature.

3 units (Anderson) not given 1997-98

239. Teaching Methods in Philosophy—For Ph.D. students in their second or third year who are teaching assistants for the department. Discussion of issues about the teaching of philosophy.

1-4 units, any quarter (Staff)

240. Individual Work for Graduates
any quarter (Staff)

242A. Philosophy of Science Seminar: The Nature of Objective Probability—The nature of probabilistic laws in biology, physics, and other
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The metaphysical question: what are objective probabilities, if anything? The scientific uses of probabilistic laws.

3 units, Aut (Strevens)

242B. Philosophy of Science Seminar: Quantum Non-Locality—The nature and implications of quantum non-locality, emphasizing Einstein’s objections to quantum mechanics and the alleged conflict of the theory with relativity.

3 units, Win (Ismael)

250. Seminar on Philosophy of Education—Perspectives on constructivism: philosophical, psychological, educational.

3 units, Spr (Phillips, Suppes)

260. Core Seminar in Philosophy of Science—For first- and second-year students in the Philosophy Ph.D. program.

4 units, not given 1997-98

270. Core Seminar in Moral Philosophy—For first- and second-year students in the Philosophy Ph.D. program.

4 units, Aut (Satz)

271. Ethics: Slavery and Prostitution
2 units, Spr (Moravcsik)

273. The Normativity of Ethics—Moral judgments are descriptive and normative. They guide action, tell us how we should be and what we should do; they impose requirements. Some philosophers say morality has authority over us. What does this normativity (or authority) consist of, and what is its basis? Why should we do right rather than wrong? Is there such a psychological state as taking moral rules to be normative, but not grounded on anything. Recent works of contemporary philosophers: Christine M. Korsgaard, Allen Gibbard, and David Copp.

3 units, Aut (Cohon)

275. Marx and Weber—Marx and Weber aspired to grasp the fundamental political problems of the human predicament (unfreedom, inequality, oppression, and bureaucratization). Both developed theories to account for these problems and investigated the extent that such problems could be mitigated or resolved, and believed that social science could contribute to our understanding of the modern world, and to our efforts to change it. Their works are evaluated with regard to our own convictions about politics, human agency, social change, and the role of knowledge.

3 units (Satz) not given 1997-98

276. Graduate Seminar on Moral Theory
3 units (Bratman) not given 1997-98

278. Xunzi Seminar—(Same as Religious Studies 248.) The ethical and political philosophy of the early Confucian philosopher Xunzi. Prerequisite: consent of instructor.

4-5 units (Ivanhoe) not given 1997-98

280. Core Seminar in Metaphysics and Epistemology—For first- and second-year students in the Philosophy Ph.D. program.

4 units, Spr (Godfrey-Smith)

281. Core Seminar in Philosophy of Language—For first- and second-year students in the Philosophy Ph.D. program.

4 units (Føllesdal) not given 1997-98

282. Philosophy and the Humanities: Philosophy of the Human Sciences—(Same as Humanities 193A.) The status of knowledge claims in the humanities, including questions about the possibility of humanistic knowledge, and its proper relation to natural scientific knowledge. Readings: Mill, Dillthey, Rickert, Cassirer, Gadamer, and some examples of humanities scholarship from history, art history, and the history of science.

3-5 units, Spr (Anderson)

284. Philosophy of Mind—Limited enrollment. Priority registration for Philosophy graduate students.

3 units, Win (Burge)

285. Meaning and The Self—The basic structure of self-knowledge; readings in Castaneda, Shoemaker, Evans, etc. Analytical approach in the context of a general account of the acquisition and use of information.

3 units, Aut (Perry)

286. Philosophy of Language: Reference
3 units, Win (Taylor)

288. Metaphysics Seminar: Platonism, Formal Ontology, and Naturalism—Can Platonism and naturalism be reconciled or must we abandon one of these ontological views? The extent to which (Platonist theories of) mathematical objects, concepts, properties, relations, possibilities, states, and types are required to understand natural science and the extent to which these objects can be accommodated in a naturalized view of the world. Epistemological questions concerning the possibility of acquiring knowledge about abstract objects.

3 units, not given 1997-98

297. Phenomenology and Logic—Phenomenological views on logic, mathematics, and computation. Emphasis is on the contemporary relevance of these views. Selections from Husserl’s work on logic and mathematics and from the recent literature.

3 units, Win (Tieszen)

298. Topics in Logic, Language, and Information—Logical analysis of common concerns on the interface of linguistics, computer science, and philosophy. Topics: dynamic semantics of texts and programs (variable binding, updating, process logics), categorial structures and substructural proof theories (quantification, polymorphism).

3 units, Spr (van Benthem)
314. **Advanced Classical Chinese Texts**—(Same as Religious Studies 314.)
4 units (Ivanhoe) not given 1997-98

322. **Leibniz**—Analysis of Leibniz' philosophical system with an emphasis on his metaphysics.
3 units, not given 1997-98

332. **Essays and Letters of Zhuang Xuechang**—(Same as Religious Studies 332.)
4 units, Win (Ivanhoe)

373. **Mind, Action, and Rationality**—(Same as Political Science 350.) Topic: the intersection of research in philosophy and the social sciences on basic issues about agency and practical reason. Prerequisite: graduate standing or consent of instructors.
3 units (Bratman, Ferejohn) not given 1997-98

380. **Graduate Seminar on Mind and Action: Animal Awareness**—Recent psychological and philosophical literature on the question of animal thought, awareness, and intentionality.
3 units (Dretske) not given 1997-98

382. **Concepts**—Metaphysical questions about the nature of concepts and epistemological cum psychological questions about the acquisition of concepts. What in natural concepts are such that a mind may deploy them in thought. What makes a particular concept the concept that it is. The extent to which theories of concept acquisition must be informed by a correct account of the metaphysical nature of concepts. Readings from philosophy and some psychological literature.
3 units (Taylor) not given 1997-98

383. **Epistemology**—Examination and comparison of Hume and Goodman on induction, and Wittgenstein on following a rule.
3 units (Godfrey-Smith) not given 1997-98

450. **Thesis**
any quarter (Staff)

AFFILIATED DEPARTMENT OFFERINGS

**CLASSICS**

15N. Stanford Introductory Seminar: Ecology in Philosophy and Literature
3-4 units, Win (Nightingale)

165. **Hellenistic Philosophy**
4 units, Aut (Wigodsky)

169. **Introduction to the Ethics of Socrates, Plato, and Aristotle**
4-5 units, Win (Nightingale)

442. **Horace’s Literary Satires and Epistles**
4-5 units, Aut (Wigodsky)

FRENCH AND ITALIAN

254E. **Introduction to French Philosophy; From 1943 to the Present**
3-5 units, Spr (Dupuy)

HISTORY

133. **The Darwinian Revolution**
4 units (Lenoir) not given 1997-98

HUMANITIES SPECIAL PROGRAMS

155. **Incorporating an American Identity: Late 19th-Century Philosophy**
5 units, Spr (Staff)

MATHEMATICS

161. **Set Theory**
3 units, Spr (Schwarz)

290A,B. **Model Theory**
3 units, Win, Spr (Feferman)

291A,B. **Recursion Theory**
not given 1997-98

292A,B. **Set Theory**
not given 1997-98

293A,B. **Proof Theory**
not given 1997-98

294. **Topics in Logic**
not given 1997-98

POLITICAL SCIENCE

155. **Hegel’s Political Philosophy**
5 units, Spr (Tunick)

RELIGIOUS STUDIES

2. **Eastern and Western Conceptions of Self**
5 units (Yearley) not given 1997-98

42. **Philosophy of Religion**
4 units, Aut (Gelber)

167. **Medieval and Renaissance Religious Philosophy**
4 units (Gelber) not given 1997-98

273. **Aquinas' Ethics**
5 units (Yearley) not given 1997-98

OVERSEAS STUDIES

These courses are approved for the Philosophy major and taught overseas at the campus indicated. Students should discuss with their major advisors which courses would best meet individual needs. Descriptions are in the "Overseas Studies" section of this bulletin or at the overseas office, 126 Sweet Hall.

FLORENCE

145P. **The Scientific Revolution: From the Renaissance to the 18th Century**—(Same as Overseas Studies 215V.)
4-5 units, Win (La Vergata)
PHYSICS

Emeriti: (Professors) Stanley S. Hanna, William A. Little, Walter E. Meyerhof, David M. Ritzson, Arthur L. Schawlow, J. Dirk Walecka
Chair: Blas Cabrera
Director of Graduate Study: Shoucheng Zhang
Director of Undergraduate Study: Douglas D. Osheroff
Associate Professors: Patricia Burchat, Giorgio Gratta, Shoucheng Zhang
Assistant Professors: Charles M. Marcus, Roger W. Romani, Scott Thomas, Jeffrey Willick
Professors (Research): John A. Lipa, Phillip H. Scherrer, Todd I. Smith, John P. Turneaure
Courtesy Professors: Peter A. Sturrock, Richard Taylor, Richard N. Zare
Consulting Professor: Theodor W. Hänsch

OFFERINGS AND FACILITIES

The Russell H. Varian Laboratory of Physics, the nearby W. W. Hansen Experimental Physics Laboratory (HEPL) and the E. L. Ginzton Laboratory form a closely related complex which houses a range of physics activities from general courses through advanced research. At the Stanford Free Electron Laser Center, located in HEPL, tunable picosecond optical beams are available for materials and biomedical research at wavelengths that extend from the visible to the far infrared. Separate from this group is the Stanford Linear Accelerator Center (SLAC), a high energy physics lab which has as its principal tools a two-mile-long 50-GeV electron accelerator and a 6-GeV electron-positron storage ring. Also at SLAC are a 30 GeV electron-positron storage ring (PEP) and the Stanford Synchrotron Radiation Laboratory (SSRL). A high-energy facility, the Stanford Linear Collider (SLC), provides electron-positron collisions at about 100 GeV in the center of mass.

Professor Fetter is director of HEPL, and Professors Cabrera, Lipa, Michelson, Scherrer, Schwettman, Smith, Turneaure, and Yearian are members of the laboratory. The Ginzton Laboratory, SLAC, and SSRL are listed in the "Independent Research Laboratories, Centers, and Institutes" section of this bulletin.

Stanford is a member of the Hobby-Eberly Telescope Consortium. This 10.4 meter telescope should begin operation in 1997 at McDonald Observatory in Texas. There will be opportunities for graduate and undergraduate students doing research projects to use this telescope starting in late 1997.

Stanford is also building (with CalTech) an underground laboratory for the study of neutrino oscillations near the Palo Verde Nuclear Generating Station, 50 miles west of Phoenix (AZ). It will become operational in the Summer of 1997 and some students are engaged in the design and construction of the experimental apparatus.

The Physics Library, a center for the reading and study of physics and astronomy at all levels, includes current subscriptions and back sets of important journals together with textbooks, scholarly treatises in English, French, German, and Russian, and the collected works of the most eminent physicists.

Course work is designed to provide students with a sound foundation in both classical and modern physics. Students who wish to specialize in astronomy, astrophysics, or space science should consult the "Astronomy Course Program" section of this bulletin.

Three introductory series of courses include labs in which undergraduates carry out individual experiments. The Intermediate and Advanced Physics Laboratories offer facilities for increasingly complex individual work. Undergraduates are also encouraged to participate in research; most can do this through the honors program.

Graduate students find opportunities for research in the fields of astrophysics, atomic physics/laser science, coherent optical radiation, condensed matter physics, high energy physics, intermediate energy physics, low temperature physics, and theoretical physics. Opportunities for research are also available with the faculty at SLAC in the areas of theoretical and experimental particle physics and accelerator design, and with the faculty in Physics and Applied Physics in the areas of astrophysics, materials research, novel imaging technology, photon science, quantum electronics, and theoretical and experimental condensed matter physics.

The number of graduate students admitted to the Department of Physics is strictly limited. Students should complete application by January 1 for the following Autumn Quarter. Graduate students may normally enter the department only at the beginning of Autumn Quarter.
UNDERGRADUATE PROGRAMS

The study of physics is undertaken by three principal classes of undergraduates: those including physics as part of a general education; those preparing for careers in professional fields that require a knowledge of physics, such as medicine or engineering; and those preparing for teaching or research careers in physics or related fields. Physics courses numbered below 200 are planned to serve all three of these groups. The courses numbered above 200 meet the needs mainly of the third group, but also of some students majoring in other branches of science and in engineering.

BACHELOR OF SCIENCE

Requirements for the degree of Bachelor of Science in Physics are: Physics 61, 63, 64, 65, 66, 70, 105, 106, 107, 110, 111, 120, 121, 122, 130, 131, 132, 170, 171, 201; Math. 41, 42, 43, 44, 130, 131; and any one additional math course numbered 100 or higher. The Physics 40 series can replace the 60 series requirements. One additional advanced physics course is required and may be selected from Physics 135, 160, 161, 172, 181, 192, 204 or 262. Math. 43H, 44H, and 45H may be substituted for Math. 43, 44, and 130. The department advises the study of some Chemistry, for example, 31 or 32, 33, and 35 and some Computer Science, for example, 106. Mathematics and physics courses taken to satisfy the department's major requirements cannot be taken on a Credit/No Credit basis. Prospective physics majors are also recommended to take Physics 59, Current Research Topics.

In an effort to increase the flexibility of the Physics major for students with strong interests in allied disciplines such as Biology, Chemistry, Electrical Engineering, Computer Science, or Mathematics, selected courses from the Physics major (indicated by an * below) may be substituted for correspondingly advanced courses in these other fields. In all cases, these modifications to the Physics major towards an interdisciplinary course of study should be worked out beforehand with the student's adviser. To decide which introductory sequence is appropriate, students contemplating majoring in physics are urged to consult with the instructor of Physics 61 or the Undergraduate Studies Coordinator at the earliest possible date to see which sequence is the most suitable. Students who enter the physics program after the freshman year are generally advised to take the Physics 61, 63, 65 sequence, provided they have previously taken Math. 41.

REQUIRED COURSES FOR MAJORS

INTRODUCTORY SEQUENCE

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 41. Mechanics</td>
<td>A</td>
<td>4</td>
</tr>
<tr>
<td>Physics 43. Electricity and Magnetism I</td>
<td>W</td>
<td>4</td>
</tr>
<tr>
<td>Physics 45. Electricity and Magnetism II</td>
<td>S</td>
<td>4</td>
</tr>
<tr>
<td>Physics 46. Electricity and Magnetism Lab</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 47. Light and Heat</td>
<td>A</td>
<td>4</td>
</tr>
<tr>
<td>Physics 48. Light and Heat Lab</td>
<td>A</td>
<td>1</td>
</tr>
<tr>
<td>Physics 61. Mechanics</td>
<td>A</td>
<td>4</td>
</tr>
<tr>
<td>Physics 63. Electricity and Magnetism</td>
<td>W</td>
<td>4</td>
</tr>
<tr>
<td>Physics 64. Electricity and Magnetism Lab</td>
<td>W</td>
<td>1</td>
</tr>
<tr>
<td>Physics 65. Optics and Thermodynamics</td>
<td>S</td>
<td>4</td>
</tr>
<tr>
<td>Physics 66. Optics and Thermodynamics Lab</td>
<td>S</td>
<td>1</td>
</tr>
<tr>
<td>Math. 41, 42, 43, 44. Calculus and Analytic Geometry (or H series)</td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>Physics 59. Current Research Topics (recommended)</td>
<td>W</td>
<td>1</td>
</tr>
</tbody>
</table>

INTERMEDIATE SEQUENCE

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 70. Modern Physics</td>
<td>A</td>
</tr>
<tr>
<td>Physics 110, 111. Intermediate Mechanics</td>
<td>A, W</td>
</tr>
<tr>
<td>Physics 120, 121, 122*. Intermediate Electricity and Magnetism</td>
<td>A, W, S</td>
</tr>
<tr>
<td>Math. 130, 131. Ordinary Differential Equations</td>
<td>A, W, S</td>
</tr>
</tbody>
</table>

ADVANCED SEQUENCE

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 130, 131, 132*. Quantum Mechanics</td>
<td>A, W, S</td>
</tr>
<tr>
<td>Physics 170, 171. Statistical Mechanics</td>
<td>A, W</td>
</tr>
<tr>
<td>Physics 201. Advanced Physics Laboratory</td>
<td>A, S</td>
</tr>
<tr>
<td>one advanced Physics elective*:</td>
<td></td>
</tr>
<tr>
<td>Physics 135. Computational Physics</td>
<td>S</td>
</tr>
<tr>
<td>Physics 160, 161. Astrophysics A, W</td>
<td>6</td>
</tr>
<tr>
<td>Physics 172. Solid State Physics</td>
<td>S</td>
</tr>
<tr>
<td>Physics 181. Optics</td>
<td>A</td>
</tr>
<tr>
<td>Physics 192. Introduction to Biophysics</td>
<td>W</td>
</tr>
<tr>
<td>Physics 203. Advanced Laboratory</td>
<td>S</td>
</tr>
<tr>
<td>one advanced Mathematics elective (100 level or higher)</td>
<td></td>
</tr>
<tr>
<td>* These courses may be substituted by correspondingly advanced courses in other fields as part of an interdisciplinary program. This should be discussed with the student's adviser.</td>
<td></td>
</tr>
</tbody>
</table>

Undergraduates are offered help with physics problems in the department counseling and tutoring center, the Reference Frame. The center is staffed Monday through Thursday, 9 a.m. to 5 p.m. and 7 to 9 p.m., and Fridays 9 a.m. to 3:15 p.m.

REQUIRED COURSES FOR MINORS

In addition to the usual University-wide requirements for graduation (successful completion of 180 units and fulfillment of the Writing, General Education, and Language requirements), an
undergraduate minor in Physics requires the following course work:

NON-TECHNICAL
For students whose majors do not require the physics 40 series:

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>physics 41, 43, 45, 47, 70 or 25</td>
<td>16</td>
</tr>
<tr>
<td>Choose two lab courses from:</td>
<td></td>
</tr>
<tr>
<td>physics 46, 48 or 72</td>
<td>2</td>
</tr>
<tr>
<td>Choose two courses from the following:</td>
<td></td>
</tr>
<tr>
<td>physics 100, 105, 107, 111°, 120°, 121°, 130°, 131°, 160, 161, 170°, 171°</td>
<td>6-8</td>
</tr>
</tbody>
</table>

TECHNICAL
For those students whose majors require physics 40 series:

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>physics 70, 72</td>
<td>4</td>
</tr>
<tr>
<td>physics 110, 120°, 130°, 170°</td>
<td>16</td>
</tr>
<tr>
<td>Choose two courses from the following:</td>
<td></td>
</tr>
<tr>
<td>physics 105, 107, 111°, 121°, 122°, 131°, 132°, 160, 161, 171°, 172°, 192</td>
<td>6-8</td>
</tr>
<tr>
<td>Total</td>
<td>26-28 units</td>
</tr>
</tbody>
</table>

† Requires differential equations.

The Minor declaration deadline is three quarters before graduation (that is, beginning Autumn Quarter if the student is graduating at the end of Spring Quarter).

HONORS PROGRAM
The department offers a program leading to the degree of Bachelor of Science in Physics with Honors:

1. Students should find a physics project, either theoretical or experimental, in consultation with individual faculty members.
2. The student submits a proposal to the honors subcommittee, which decides on its suitability as an honors project.
3. Course credit for the project is assigned by the adviser within the framework of Physics 205.
4. A written report of the work at its completion is required for honors.
5. Before the end of the year, each candidate gives a seminar on his or her work. This seminar is publicized and is open to the general public. The expectation is that the student's adviser, along with all the other honors candidates, will attend the seminar.
6. The decision as to whether a given independent study project does or does not merit award of honors is made jointly by the honors subcommittee and the student's adviser. This decision is based on the quality of both the honors work and the other work in physics.
7. The work done in the honors program may not be used as a substitute for regularly required courses.

GRADUATE PROGRAMS
MASTER OF SCIENCE
The department does not offer a separate program for the M.S. degree, but this degree may be awarded for a portion of the Ph.D. degree work.

University requirements for the master's degree, discussed in the "Graduate Degrees" section of this bulletin, include registration for at least three quarters at full tuition as a graduate student and completion of 36 units of course work after the bachelor's degree. Among the department requirements are a grade point average (GPA) of at least 'B' in courses 201, 203, 210, 211, 212, 220, 221, 230, 231, or their equivalent. Up to 6 of these required units may be waived on petition if a thesis is submitted.

DOCTOR OF PHILOSOPHY
The University's basic requirements for the Ph.D. (residence, dissertation, examination, and so on) are discussed in the "Graduate Degrees" section of this bulletin. The minimum department requirements for the Ph.D. degree in Physics consist of completing all courses listed below, and at least one quarter from each of two subject areas (among condensed matter, quantum optics and atomic physics, astrophysics and gravitation, and nuclear and particle physics) chosen from courses with numbers above 232, except 290 and 294. The requirements in this list may be fulfilled by passing the course at Stanford or passing an equivalent course elsewhere: 201, 203, 210, 211, 212, 220, 221, 230, 231, 232, 290, 294. A GPA of at least 'B' is required in all the courses taken toward the degree.

All Ph.D. candidates must have math proficiency equivalent to the following courses: 106, 113, 114, 130, 131, 132.

Prior to making an application for candidacy, each student is required to pass a written examination on undergraduate physics. This comprehensive undergraduate exam is given annually at the beginning of Autumn Quarter. Graduate physics is tested by the exams in the first-year courses (210-232). A thesis proposal must be submitted during the third year. In order to assess the direction and progress toward a thesis, an oral report and evaluation is required during the fourth year. After completion of the dissertation, each student must take the University oral examination (defense of dissertation). The Physics faculty also believes that a scientist should have facility with a foreign language for cultural reasons as well as to establish better contact at meetings in foreign countries.

Three quarters of teaching (including a demonstrated ability to teach) are a requirement for obtaining the Ph.D. in Physics.

Students interested in applied physics and biophysics research should also take note of the Ph.D.
granted independently by the Department of Applied Physics and by the Biophysics Program administered through the Department of Chemistry. Students interested in astronomy, astrophysics, or space science should also consult the “Astronomy Course Program” section of this bulletin.

The department office has more detailed information on how to obtain an advanced degree in physics and should be consulted by prospective candidates.

Ph.D. MINOR

Minors in Physics must take at least six courses numbered 210 to 232 among the 20 required units. All prospective minors must obtain approval of their physics course program from the Physics Graduate Study Committee at least one year before award of the Ph.D.

FELLOWSHIPS AND ASSISTANTSHIPS

The Department of Physics makes an effort to support all its graduate students through fellowships, teaching assistantships, research assistantships, or a combination of sources. Information on application procedures is mailed with the admission information.

TEACHING CREDENTIALS

For information on teaching credentials, consult the “School of Education” section of this bulletin or address an inquiry to the Credential Administrator, School of Education.

The degree of Master of Arts in Teaching is offered jointly by this department and the School of Education. The degree is intended for those who have a teaching credential and wish to strengthen their academic preparation. The program consists of a minimum of 25 units in the teaching field and 12 units in the School of Education. A suggested minimum would be Physics 57, 64, 66, 105, 110, 111, 120, 121, and Math. 130, 131. Detailed requirements for the degree are outlined in the “School of Education” section of this bulletin.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

There are four series of beginning courses. The Ten Series (11, 14, 15A,B, 19, 27) is recommended for the humanities or social science student who wishes to become familiar with the methodology and content of modern physics. The Twenty Series (21, 22, 23, 24, 25, 26) is recommended for general students and for students preparing for medicine or biology. The Forty Series (41, 43, 45, 46, 47, 48) is for students of engineering chemistry, geology, mathematics, and some physics majors. The Advanced Freshman Series (61, 63, 64, 65, 66) is for the well-prepared student and is the preferred introductory series for those physics majors who have the appropriate background.

Both the Twenty and Forty Series consist of demonstration lectures on fundamental principles of physics, problem work on application of these principles to actual cases, and lab experiments closely correlated with the lectures. Their objectives are not only to give information on particular subjects, but also to provide training in the use of the scientific method. The primary difference between the two series of courses is that topics are discussed more thoroughly and treated with greater mathematical rigor in the Forty Series.

Courses beyond 99 are numbered in accordance with a three-digit code. The first digit indicates the approximate level of the course: undergraduate courses (1); first-year graduate courses (2); more advanced courses (3); research, special, or current topics (4). The second digit indicates the general subject matter: laboratory (0); general courses (1), (2), (3); nuclear physics (4); elementary particle physics (5); astrophysics, cosmology, gravitation (6); condensed matter physics (7); optics and atomic physics (8); miscellaneous courses (9).

11. Symmetries of Nature—For humanities and social science students. Concepts of atomic and subatomic physics; how physicists have used symmetry principles to discover the laws of nature on a subatomic scale, and how symmetries determine the behavior of atoms, nuclei, and elementary particles. Offered occasionally. 3 units

12. Stanford Introductory Seminar: Science, Society, and Politics—Preference to sophomores. Scientific research has a profound impact on society, and society has come to expect solutions to important social issues. The public debates on proposed, ongoing, or recently abandoned major scientific projects and programs, including: global warming and ozone depletion, the danger posed by asteroid collisions, the cancellation of the Superconducting Supercollider, the U.S. decision to build the Space Station jointly with Russia, “clean” nuclear power from fusion, and cosmology and the Hubble telescope. Offered occasionally. 4 units


15. Topics in Modern Astronomy—15A and B are for students not majoring in the physical sciences
and are taught in different quarters by different instructors, but are related in topic. Students should take either 15A or 15B.

15A. The Nature of the Universe—(Enroll in Astronomy 15A.) GER:2a (DR:5) 3 units, Win (Linde)
15B. Cosmic Horizons—(Enroll in Astronomy 15B.) GER:2a (DR:5) 3 units, Spr (Willick)

18N. Stanford Introductory Seminar: Revolutions in Concepts of the Cosmos—Preference to freshman. Faculty led dialogue with enrollment limited to 20 students in one section which meets twice in class and once at the Stanford Student Observatory per week. Introduction to four revolutionary changes in humanity’s concept of the cosmos. The observational basis for each revolution is directly explored at the Observatory. The four revolutions are Copernicus’ heliocentric model of the solar system, Herschel’s concept of the galaxy as a collection of stars, Shapley’s model of the Milky Way galaxy, and Hubble’s discovery that the universe is expanding. 4 units, Spr (Walker)

19. An Introduction to Physics (Physics for Poets)—Non-technical survey of the methodology of physics and some of the achievements in understanding the physical world. Topics: classical conservation laws, relativity, nuclear, and particle physics, the Standard Model and where we are today. High school algebra and trigonometry are used. GER:2a (DR:5) 3 units, Aut (Gratta)

21. Mechanics and Heat—For biology, social science, premedical students. Introduction to Newtonian mechanics, fluid mechanics, theory of heat. Calculus is used as a language and developed as needed. Prerequisites: working knowledge of elementary algebra and trigonometry. GER:2a (DR:5) 3 units, Aut (Linde)

22. Mechanics and Heat Laboratory—Pre- or corequisite: 21. 1 unit, Aut (Linde)

23. Electricity and Optics—Electric charges and currents, magnetism, induced currents; wave motion, interference, diffraction, geometrical optics. Prerequisite: 21. GER:2a (DR:5) 3 units, Win (Wojcicki)

24. Electricity and Optics Laboratory—Pre- or corequisite: 23. 1 unit, Win (Wojcicki)

25. Modern Physics—Introduction to modern physics. Relativity, quantum mechanics, atomic theory, radioactivity, nuclear reactions, nuclear structure, high energy physics, elementary particles, astrophysics, stellar evolution, and the big bang. Prerequisite: 23 or consent of instructor. GER:2a (DR:5) 3 units, Spr (Romani)

26. Modern Physics Laboratory—Pre- or corequisite: 25. 1 unit, Spr (Romani)

27. Evolution of the Cosmos—(Enroll in Astronomy 27.) GER:2a (DR:5) 3 units, Aut (Wagoner)

28. Mechanics, Heat, Electricity, and Magnetism I—For biology, social science, premedical students. The sequence 28 and 29 fulfills, in ten weeks, the one-year college physics requirement (with lab) of most medical schools. Topics: Newtonian mechanics, fluid mechanics, theory of heat, electric charges, and currents. Calculus is used as a language and developed as needed. Prerequisite: working knowledge of elementary algebra and trigonometry. GER:2a (DR:5) 6 units, Sum (Staff)

29. Electricity and Magnetism II, Optics, Modern Physics—Magnetism, induced currents; wave motion, optics; relativity, quantum mechanics, atomic theory, radioactivity, nuclear structure and reactions, elementary particles, astrophysics, and cosmology. Prerequisite: 28. GER:2a (DR:5) 6 units, Sum (Staff)

41. Mechanics—Vectors, particle kinematics and dynamics, work, energy, momentum, angular momentum; conservation laws; rigid bodies. Discussions based on use of calculus. Corequisite: Math. 19 or 41, or consent of instructor. GER:2a (DR:5) 3 units, Aut (Michelson)

41N. Stanford Introductory Dialogue: Mechanics—Preference to freshman. Faculty led dialogue with enrollment limited to 40 in two sections meeting once a week. Special topics associated with 41, above, at a more advanced level, with student participation. Corequisite: 41 or advanced placement. 1 unit, Aut (Burchat)

43. Electricity—Oscillations. Electric charges and fields, capacitance, resistance; steady currents and magnetic fields. Prerequisites: 41, and Math. 19 or 41. Corequisite: Math. 20 or 42, or consent of instructor. GER:2a (DR:5) 3 units, Win (Schwettman)

43N. Stanford Introductory Dialogue: Electricity—Preference to freshman. Faculty led dialogue with enrollment limited to 40 in two sections meeting once per week. Special topics, associated with 43, above, at a more advanced level with student participation. Corequisite: 43 or advanced placement. 1 unit, Win (Willick)

45. Magnetism—Time varying currents and fields, inductance, Maxwell’s equations, electromagnetic oscillations and waves. Special relativity. Prerequisite: 43. GER:2a (DR:5) 3 units, Spr (Michelson)
46. Electricity and Magnetism Laboratory—Pre- or corequisite: 45.
   1 unit, Spr (Michelson)

47. Light and Heat—Reflection and refraction of light, lenses; light and electromagnetic waves; temperature, properties of matter; introduction to kinetic theory of matter. Prerequisites: 53 and Math 43, or consent of instructor. GER:2a (DR:5)
   4 units, Aut (Osheroff)

48. Light and Heat Laboratory—Pre- or corequisite: 47.
   1 unit, Aut (Osheroff)

50. Astronomy Laboratory and Observational Astronomy—(Enroll in Astronomy 50.) GER:2a (DR:5)
   3 units, Aut, Sum (Walker)

59. Current Research Topics—Recommended for all prospective physics majors. Major areas of current research. Topics: fundamental particles, solid state physics, low temperature physics, biophysics, and astrophysics. Lectures by faculty and physicists with research interests in these fields.
   1 unit, Win (Burchat)

61,63,65. Advanced Freshman Physics—Recommended for students contemplating a major in Physics and other students interested in a more rigorous treatment of physics. Fundamental structure of classical physics including Newtonian mechanics, special relativity, and electricity and magnetism; selected topics in heat and light in Spring Quarter. Lectures and small discussion sections. Prerequisites: high school physics and familiarity with calculus (differentiation and integration in one variable); prior or concurrent registration in Math. 42. Physics 61, 63, and 65 are all GER:2a (DR:5)
   61. 4 units, Aut (Marcus)
   63. 4 units, Win (Marcus)
   65. 4 units, Spr (Marcus)

64,66. Advanced Freshman Physics Laboratories—Experimental work in mechanics, electricity and magnetism, and optics. Prerequisite: 61.
   64. 1 unit, Win (Marcus)
   66. 1 unit, Spr (Marcus)

70. Modern Physics—Relativity, experimental basis of quantum theory, Schrödinger equation, atomic structure, nuclear structure, high energy physics, elementary particles. Prerequisite: 45. Recommended: prior or concurrent registration in Math. 130. GER:2a (DR:5)
   3 units, Aut (Willick)

72. Modern Physics Laboratory—Pre- or corequisite: 25 or 70.
   1 unit, Aut (Willick)

   1 unit, Spr (Osheroff)

81Q. Stanford Introductory Seminar: Quantitative Observations in Astrophysics—Preference to sophomores. Description of some important questions in modern astrophysics and cosmology: the expansion and age of the Universe, the death of stars, the existence of black holes. Emphasis is on how modern telescopes and instruments allow extraction of quantitative answers. Class includes term project to make a quantitative measurement related to these key questions with student observations and data analysis at the teaching observatory: e.g., star cluster ages, quasar redshifts, or compact object binary orbits.
   1 unit, Win (Romani)

82Q. Stanford Introductory Seminar: Understanding the Universe—Preference to sophomores. The history and structure of our cosmic environment. How recent advances in observations at various wavelengths are expanding the horizons of our knowledge, looking directly back in time. Possible topics: What is the nature, amount, and distribution of the “dark matter” which appears to dominate the universe? What is the geometry and fate of the universe? What was the nature of the early universe?
   1 unit, Aut (Wagoner)

83Q. Stanford Introductory Seminar: The Physics of Terrorist Bomb Detection—Preference to sophomores. The bombing of Pan Am 103 over Lockerbie, Scotland in December 1988 has pushed efforts to develop a suitable bomb detector to protect airplanes, buildings, tunnels, and other terrorist targets. The limitations imposed on a successful detection system, the physics principles already tried or under development, and the “dream” stage. Site visits are made to industrial laboratories engaged in making bomb detectors. Prerequisite: high school background in physics.
   3 units, Aut (Hanna)

84Q. Stanford Introductory Seminar: On Growth and Form—Preference to sophomores. Introduces important concepts in physics by analyzing shapes of objects and growth mechanisms from a statistical mechanics point of view. Concepts such as self similarity, fractals, and random processes describe the objects. Simple computer simulations study and visualize objects. Demonstrations prepared by instructor and the students.
   1 unit, Spr (Kapitulnik)
100. Introduction to Observational and Laboratory Astronomy—(Enroll in Astronomy 100.)
GER:2a (DR:5)
4 units (Staff) given 1998-99

105,106,107. Intermediate Physics Laboratory Seminars—Sequence in experimental techniques required of all Physics majors. Topics: electronics, detectors and radioactive sources, optics and lasers, statistics and data handling. One-hour weekly lecture, usually Friday noon and one to two afternoons a week in lab. 106 consists of student prepared low-temperature experiments. Prerequisites: 46 or 64 and 66; prior or concurrent registration in 48 and the 120 series.

105. Laboratory Seminar I: Electronics
3 units, Aut (Pam)

106. Laboratory Seminar II: Low Temperature Physics and Introduction to Research
3 units, Win (Osheroff)

107. Laboratory Seminar III—(WIM)
3 units, Spr (Schwertman)

110,111. Intermediate Mechanics—Mechanics of systems of particles and rigid bodies. Coordinate transformation and vectors; Newtonian mechanics; linear and nonlinear oscillations; Hamilton’s principle, Lagrangian and Hamiltonian dynamics; central forces, planetary motion; collisions; non-inertial reference systems; rigid body dynamics; coupled oscillations; and introductory fluid mechanics. Prerequisites: 41 or 61, and Math. 130.

110. 4 units, Win (Gratta)
111. 4 units, Spr (Kono)

120,121,122. Intermediate Electricity and Magnetism—Vector analysis, electrostatic fields, including multipole expansion; dielectrics. Special relativity and transformation between electric and magnetic fields. Maxwell’s equations. Static magnetic fields, magnetic materials. Electromagnetic radiation, plane wave problems (free space, conductors and dielectric materials, boundaries). Dipole and quadrupole radiation. Wave guides and cavities. Prerequisites: 45 or 63; concurrent or prior registration in Math. 130 or 131 with Physics 120 and 121, respectively. Recommended: concurrent or prior registration in Math. 103.

120. 4 units, Aut (Dimopoulos)
121. 4 units, Win (Thomas)
122. 4 units, Spr (Wagoner)

130,131,132. Quantum Mechanics—The origins of quantum mechanics, wave mechanics, and the Schrödinger equation. Heisenberg’s matrix formulation of quantum mechanics, solutions to one-dimensional systems, separation of variables and the solution to three-dimensional systems, the central field problem and angular momentum eigenstates, spin and the coupling of angular momentum, Fermi and Bose statistics, perturbation theory and other approximation techniques. Scattering theory: partial wave expansion, Born approximation, Green’s functions. Reference to problems in atomic and nuclear physics explaining the basic phenomenology of these disciplines. Invariance principles and conservation laws in the context of quantum theory. Prerequisites: 70 or equivalent and 110, 111; concurrent or prior registration in 120, 121, 122, and Math. 130, 131.

130. 4 units, Aut (Laughlin)
131. 4 units, Win (Laughlin)
132. 4 units, Spr (Laughlin)

135. Computational Physics—Development of computational methods with application to problems in classical, electro-, quantum, and statistical mechanics. Numerical integration; solution of ordinary differential equations including the Runge-Kutta method; solutions of the heat equation and Poisson’s equation with relaxation methods, etc.; Monte Carlo methods; matrix methods and eigenvalue problems. Short introduction to Basic programming; class projects may be programmed in Basic, Fortran Pascal, or C. Offered occasionally. Prerequisites: 110, 111, 121; Math. 130.

3 units, Spr (Cabrera)


3 units, given 1998-99

160. Introduction to Stellar and Galactic Astrophysics—Physics of the sun. Evolution and death of stars. White dwarfs, novae, planetary nebulae, supernovae, neutron stars, pulsars, binary stars, x-ray stars, and black holes. Galactic structure: interstellar medium, molecular clouds, HI and HII regions, star formation and element abundances. Prerequisites: calculus and one year of college physics at the level of the Physics 40 series or equivalent.

3 units, Aut (Petrosian)

161. Introduction to Extragalactic Astrophysics and Cosmology—Observations of the distances and compositions of objects on cosmic scales: galaxies, galaxy superclusters, quasars and diffuse matter at high redshift. Big bang cosmology, including cosmic expansion, the origin of matter and the elements, inflation, and creation of structure in the universe. Observational evidence for dark matter. Models for the fate of the universe. Emphasis is on physical processes in the early universe. Prerequisites: calculus and one year of college physics at the level of the 40 series.

3 units, Win (Romani)

170,171. Thermodynamics, Kinetic Theory, and Statistical Mechanics—Derivation of laws of thermodynamics from basic postulates; determination of relationship between atomic substructure and
macroscopic behavior of matter. Temperature, equations of state, heat, internal energy, entropy, reversibility, applications to various properties of matter, absolute zero and low-temperature phenomena. Distribution functions, transport phenomena, fluctuations, equilibrium between phases, phase changes, the partition function for classical and quantum systems, Bose-Einstein condensation, and the electron gas. Cooperative phenomena including ferromagnetism, the Ising model, and lattice gas. Irreversible processes. Prerequisites: 47 or admission to Advanced Sequence, and Math. 130.

170. 4 units, Aut (Fetter)

171. 4 units, Win (Kapitulnik)

172. Physics of Solids—Introduction, emphasizing thermal, electrical, and magnetic properties. Elementary treatment of phonons in solids, electrons in metals, energy bands. Applications to semiconductors, rectification, superconductors, para- and ferromagnetism, magnetic resonance. Prerequisite: 171. 3 units, Spr (Beasley)

181. Intermediate Optics—Electromagnetic waves, superposition, interference, Fraunhofer and Fresnel diffraction, crystal optics, matrix optics, laser beams and resonators, guided waves, quantum aspects of light. Prerequisite: 122. 3 units, Aut (Byer)

181L. Intermediate Optics Laboratory—Corequisite: 181. 1 unit, Aut (Byer)

190. Independent Study—Undergraduate research in experimental or theoretical physics under supervision of a faculty member. Prerequisites: superior work as an undergraduate physics major; approval of the instructor and of the Undergraduate Study Committee of the department. any quarter (Staff)

198. History of Physics—(Enroll in History and Philosophy of Science 168.) 3-5 units (Dresden) not given 1997-98

201, 203. Advanced Physics Laboratory—(Optional for Physics majors.) Experiments in atomic, nuclear, solid state, and low-temperature physics; optics; and particle physics. 201 has individually prepared lab experiments. 203 consists of continued experiments at the Advanced Physics Lab level or preparation of a new experiment. Prerequisites: 105, 107. Recommended: prior or concurrent registration in 171. 201. 3 units, Aut (Kapitulnik) Spr (Wojcicki)

203. 3 units, Aut (Kapitulnik) Spr (Wojcicki)

204. Senior Seminar in Theoretical Physics—Topics of recent interest in theoretical physics: Bose-Einstein condensation of atoms, high Tc superconductivity of cuprates, quantized Hall effect, quantum chaos, superfluidity of H3e. Work in the seminar may provide a basis for an honors project in theoretical physics. Prerequisite: 132 or consent of instructor. 3 units, Spr (Zhang)

205. Honors Undergraduate Research—Experimental or theoretical project and thesis in physics under supervision of a faculty member. Planning of the thesis project should begin no later than middle of the junior year. Successful completion of an honors thesis leads to graduation "with departmental honors." Prerequisites: superior work in physics as an undergraduate major and approval of the honors committee. 1-8 units, Aut, Win, Spr (Marcus) Sum (Staff)

207, 208. Laboratory Electronics—(Enroll in Applied Physics 207, 208.)

207. 3 units, Win (Fox)

208. 3 units, Spr (Fox)

210. Advanced Particle Mechanics—Lagrangian and Hamiltonian dynamics of particles (review), small oscillations, and rigid body motion. Transition to continuum mechanics. Prerequisites: 111, 122. 3 units, Aut (Peskin)

211. Continuum Mechanics—Fluid mechanics: foundations, kinematics, and dynamics of incompressible and compressible flows. Surface waves, weather, sound and shock waves, and possibly elasticity (waves). Examples from fluid mechanics (instabilities, turbulence, etc.) and other fields are provided as physical background for the analysis of simple nonlinear systems. Emphasis on phase-plane analyses, attractors, and transition to chaos. Prerequisite: 210. 3 units, Win (Wagoner)


215. Numerical Methods for Physicists and Engineers—(Enroll in Applied Physics 215.) 3 units, Spr (Doniach)

220, 221. Classical Electrodynamics—Electrostatics and magnetostatics: conductors and dielectrics, magnetic media, electric and magnetic forces and energy. Maxwell's equations; electromagnetic waves, Poynting's theorem, electromagnetic properties of matter, dispersion relations, wave guides and cavities, magnetohydrodynamics. Special Relativity: Lorentz transformations, covariant equations of electrodynamics and mechanics, Lagrangian formulation, Noether's theorem and conservation
laws. Radiation: dipole and quadrupole radiation, electromagnetic scattering and diffraction, the optical theorem, Liénard-Wiechert potentials, relativistic Larmor's formula, frequency and angular distribution of radiation, synchrotron radiation. Energy losses in matter: Bohr's formula, Cherenkov radiation, bremsstrahlung and screening effects, transition radiation. Prerequisites: 122 or equivalent; Math. 106 and 132, or concurrent registration in Physics 210 and 211.

220. 3 units, Aut (Zhang)
221. 3 units, Win (Zhang)


230. 3 units, Aut (Chu)
231. 3 units, Win (Chu)
232. 3 units, Spr (Chu)

240. Asymptotics Methods in Physics Problems—Use of the notion of asymptotics in physics. Algebraic equations, branching (eigenfrequencies of small oscillations). Asymptotic estimates of integrals (short and long time behavior, near and far field, group velocity and energy transport by waves); uniform asymptotics. Asymptotic methods for ODEs: coordinate and parameter asymptotics, regular and singular perturbations; WKB method (quasiclassical approximation, one-dimensional wave propagation); Poincare method, “fast” and “slow” variables (perturbation of periodic orbits, weak dissipation, adiabatic invariants); matched asymptotic expansions—boundary layers (problems of electrostatics, heat conductivity, elasticity, etc.). Asymptotic methods for PDEs: ray method for multi-dimensional linear wave propagation (rays, wavefronts, least-time path principle, caustics for waves of different physical origin); matched asymptotic expansions—boundary layers and “thin” bodies (applications to electrostatics, hydrodynamics and MHD, linear elasticity, etc.); multi-scale expansions: homogenization, effective parameters for composite bodies. Examples from various branches of physics (astrophysics and general relativity).

240. Asymptotics Methods in Physics Problems—Phys. 230. 3 units, Spr (Silbergleit)

252. Introduction to High Energy Physics—Graduate section; see 152.

3 units (Gratta)

262. Introduction to Gravitation and Astrophysics—Tensor analysis: special relativity, the energy-momentum tensor, and curvature. Einstein's equations: weak fields, tests, spherically-symmetric solutions, gravitational waves. Cosmology, black holes, stellar structure, and other topics in astrophysics, as time permits. Prerequisites: 111, 122. Recommended: concurrent enrollment in 211.

3 units, Spr (Michelson)

271. Introduction to Solid State Physics—Reviews key discoveries in condensed matter physics in the past 15 years, with emphasis on experiment. Topics: sliding charge density waves in layer compounds, the first pressure-induced Mott transition, the first organic superconductor, the discovery of superfluid 3He, quasicrystals, the Sharvin effect, the quantum hall effect, and re-entrant superconductivity. Journal club format, with presentations by students on assigned topics. Offered occasionally.

0-3 units
variable stars. Limited enrollment. Offered occasionally. Prerequisite: consent of instructor.
3 units, Sum (Walker)

312. Basic Plasma Physics—(Enroll in Applied Physics 312.)
3 units, alternate years, given 1998-99

320. Quantum Optics and Selected Topics in Atomic Physics—Quantization of the electromagnetic field, photon states, and vacuum fluctuations and atomic transitions of real atoms. Two-level atoms, the Optical Bloch Equations, dressed states, coherent transients, resonance fluorescence, laser cooling and trapping of atoms and ions, tests of quantum mechanics and Bell’s Theorem, photon statistics, coherence, antibunching, squeezed states, and parity non-conservation and time-reversal invariance tests in atomic physics.
3 units (Staff) alternate years, given 1998-99

3 units (Staff) alternate years, given 1998-99

324. Introduction to Accelerator Physics—(Enroll in Applied Physics 324.)
3 units, Aut (Siemann)
alternate years, not given 1998-99

325. Electromagnetic Radiation from Relativistic Electrons—(Enroll in Applied Physics 325.)
3 units (Wiedemann) given 1998-99

3 units, Aut (Kallosh)

331. 3 units, Win (Kallosh)
332. 3 units, Spr (Kallosh)

351,352. Elementary Particle Physics—Phenomenology of elementary particle interactions, and their theoretical interpretation. Winter: introduction to the Standard model—features of high-energy interactions of hadrons; deeply inelastic lepton-hadron scattering; structure functions; the parton model; QCD, gluons, and scaling violations; jets and quark fragmentation in rr(LC) and e+e- annihilation to hadrons; radiative corrections in QED and QCD; running coupling constants; experimental measurements of the strong coupling; Monte Carlo techniques. Spring: Hadron spectroscopy in the static quark model; properties of heavy quarks and quarkonium systems. Weak interactions: muon, pion, and beta decay; weak mixing angles; the K_s-M系统 on CP violation; charged and neutral current neutrino scattering; the standard model of electroweak interactions; determinations of sin^2(q), properties of W and Z bosons; gauge symmetries and the Higgs mechanism; properties of Higgs particles. Introduction to topics beyond the standard model: grand unification, proton decay, super-symmetry. Prerequisite: 330.
alternate years, not given 1998-99

351. 3 units, Win (Gratta)
352. 3 units, Spr (Dimopoulos)

360. Stellar Physics—Astronomical data on stars and star clusters; classification, Hertz-Spring-Russell diagram. Equations of hydrostatic equilibrium and energy transport, equation of state for normal and degenerate matter, opacity, nuclear, and neutrino processes. Stellar evolution from main sequence to white dwarfs, neutron stars, and black holes. Prerequisite: 220 or equivalent, or consent of instructor. Recommended: 132.
3 units (Petrosian)
alternate years, given 1998-99

362. High Energy Astrophysics—Transport and radiation processes of high energy particles in relativistic magnetized plasmas. Accretion disk structures and stability. Application to acceleration of particles and their radiation in the interstellar medium and supernova remnant; in pulsars, binary x-ray sources, gamma ray bursts and active galactic nuclei or quasars. Prerequisites: 132 or 221, or equivalents.
3 units (Staff) alternate years, given 1998-99

3 units (Sturrock)
alternate years, given 1998-99

364. Advanced Gravitation—Fundamental principles and experiments. Differential geometry. General structure of Einstein’s equations. Major applications: cosmology, stars, and black holes; genera-
tion and detection of gravitational radiation. Prerequisites: 220, 221.
3 units (Staff) given 1998-99

365. Extragalactic Astrophysics and Cosmology—Basic observational data and theories of the structure and evolution of the universe, emphasizing the relevant physical processes. Cosmic background radiation, gravitational lensing. Observational properties and theoretical models of galaxies, quasars, and other galactic activity. Prerequisite: 221 or equivalent.
3 units, Win (Petrosian) alternate years, not given 1998-99

3 units (Staff) alternate years, given 1998-99

3 units, Win (Shen)

373. Solid State Physics: Continuation—(Enroll in Applied Physics 373.)
3 units, Spr (Harrison)

374. Cooperative Phenomena—(Enroll in Applied Physics 374.)
3 units (Kapitulnik) alternate years, given 1998-99

375. Electronic Structure—(Enroll in Applied Physics 375.)
3 units (Harrison) alternate years, given 1998-99

3 units (Staff) alternate years, given 1998-99

377. Literature of Condensed Matter Physics—Review of key discoveries in condensed matter physics in the past 15 years, with emphasis on experiment. Topics: sliding charge density waves in layer compounds, the first pressure-induced Mott transition and organic superconductor, the discovery of superfluid 3He, quasicrystals, the Sharvin effect, the Quantum Hall effect, and reentrant superconductivity. Journal Club format with presentations by students on assigned topics.
3 units (Staff) given 1998-99

3 units (Harrison) alternate years, given 1998-99

383. Introduction to Atomic Processes—(Enroll in Applied Physics 383.)
3 units, Aut (Harris) alternate years not given 1998-99

387. Quantum Optics and Measurements—(Enroll in Applied Physics 387.)
3 units (Yamamoto) alternate years, given 1998-99

388. Mesoscopic Quantum Physics and Nanostructures—(Enroll in Applied Physics 388.)
3 units, Win (Yamamoto) alternate years, not given 1998-99

392. Topics in Molecular Biophysics—(Enroll in Applied Physics 392.)
3 units (Doniach) alternate years, given 1998-99

450,451,452. Theoretical Physics of Particles and Fields—Advanced topics in theoretical high-energy physics. Topics change quarterly and year by year to provide a background in all areas of current theoretical research. Prerequisite: 332.
450. Introduction to Supersymmetry
3 units, Aut (Thomas)
451. Elements of String Theory
3 units, Win (Peskin)
452. Strings, Branes, and Duality
3 units, Spr (Susskind)

460. Astrophysics Seminar—Discussion of current research and literature in astrophysics. Offered by faculty, students, and outside specialists. (AU)
1 unit, Aut, Win, Spr (Petrosian)

463. Special Topics in Astrophysics—Research level discussions of current topics in astrophysics. Content varies each quarter and year, depending on the interests of staff and students. Topics to be announced. Offered occasionally.
3 units

473A. Condensed Matter Physics—(Enroll in Applied Physics 473A.)
2 units, Aut (Beasley)
Win (Beasley, Kapitulnik)
Spr (Kapitulnik)

490. Research Orientation—Familiarizes students with activities of one or more research groups, within the department or outside. Registration limited to one quarter per research group with overall limitation of two quarters. Prerequisite: consent of student’s adviser.
any quarter (Staff)
491. Research—Open only to graduate physics major students, with consent of instructor. Work is in experimental or theoretical problems in research, as distinguished from independent study of non-research character in 190 and 293. If taken under the supervision of a faculty member outside the department, Physics Graduate Study Committee approval required.

any quarter (Staff)

POLITICAL SCIENCE

Chair: Barry Weingast
Professors: David B. Abernethy, Lucius J. Barker, David W. Brady, John Ferejohn (on leave Winter, Spring), David J. Holloway, Stephen D. Krasner, John F. Manley, Terry M. Moe, Daniel I. Okimoto, Susan M. Okin, Robert A. Packenham, Condoleezza Rice, Douglas Rivers, Philippe C. Schmitter (on leave Autumn, Spring), Paul M. Sniderman (on leave Winter, Spring), Barry R. Weingast
Associate Professors: Luis R. Fraga, Judith L. Goldstein, Terry L. Karl (on leave Autumn, Spring), Jean C. Ol, Scott D. Sagan
Assistant Professors: Kurt T. Gaubatz (on leave Autumn), Simon Jackman, H. W. Jerome Maddox, Michael A. McFaul, Mark Tunick (on leave Autumn), Carolyn Wong
Courteous Professors: David P. Baron, Jonathan B. Bendor, Gerhard Casper, Steven H. Chaffee, Larry Diamond, Gerald Dorfman, Jean-Pierre Dupuy, Lawrence Friedman, Keith Krehbiel, Gail Lapidus, Bruce Bueno de Mesquita, James D. Morrow, Roger Noll, Michel C. Ok-nenberg, Jack N. Rakove
Courteous Associate Professor: Coit D. Blacker
Affiliated Professors: Michael W. Kirst, Michael M. May
Senior Lecturer: Elisabeth Hansot
Lecturers: Adrienne Jamieson, Kimberly A. Yuracko
Consulting Assistant Professor: Ronald L. Jefferson
Visiting Professor: Norman Jacobson
Visiting Associate Professor: Cobie Harris, Stephen Stedman
Visiting Assistant Professor: Alan Taylor
Visiting Lecturer: Aaron Belkin

UNDERGRADUATE PROGRAMS
BACHELOR OF ARTS

To receive an A.B. in Political Science, a student must:

1. Complete 60 units, at least 50 of them in Political Science courses. Up to 10 units may be from courses outside the department that are related to the student’s interests in Political Science and are not entry-level courses in other disciplines (such as Economics 1 or Psychology 1). All courses counted for the degree must be taken for a letter grade.

2. Satisfy a depth requirement. Each major should declare a primary concentration in one sub-field and take at least 20 units in this concentration, including the introductory course for that sub-field. Subfields include:
   - Comparative Politics (110-129, 210-229)
   - International Relations (130-149, 230-249)
   - Political Theory (150-169, 250-269)
   - American Politics (170-198, 270-298)
A student may propose an individual primary concentration in a special subfield, for example, politics in advanced industrial democracies, political organizations, public policy, the politics of development, or formal models in political science. This concentration proposal is subject to the approval of the Director of Undergraduate Studies.

3. Satisfy a breadth requirement. Each major should declare a secondary concentration in another subfield, with at least 10 units in that concentration.

Each major should take at least 5 units in a third subfield.

A secondary concentration may be designed by the student and is subject to the approval of the Director of Undergraduate Studies.

4. Demonstrate the capacity for sustained research and writing in the discipline. This requirement is satisfied by taking a political science seminar course which has been designated a Writing in the Major (WIM) course. In such a course, students write and revise a paper of at least 15 pages.

5. Submit a proposal to declare the Political Science major which must be approved by the Director of Undergraduate Studies. This proposal contains a brief essay noting a student’s reasons for wanting to major in Political Science, principal interests, and career plans. It lists the political science and related major courses taken and those proposed, indicating how these courses fit into a coherent course of study.

MINORS
Students must complete their declaration of the minor no later than the last day of the quarter two
secure the agreement of a regular faculty member to be their thesis adviser. No faculty member can effectively supervise more than a few honors theses each year. Application to the program should therefore be made as early as possible, and well before the beginning of the quarter in which the student wishes to enter the program. Application forms can be obtained from the department office, should be countersigned by both the student and his or her thesis adviser, and then approved by the Director of the Honors Program. Normally, the thesis adviser is a faculty member with whom the student has already worked. Normally, too, students enroll in the program by the Autumn Quarter of the senior year and have at least a grade point average (GPA) of 3.5 in political science courses when they apply.

The program is based on the assumption that good writing takes time. Students are, therefore, strongly discouraged from attempting to complete an honors thesis in less than three quarters. While details are always worked out on an individual basis between students and thesis advisers, the following patterns are typical: (1) If a student already has substantial background on the thesis topic, the honors thesis program can be completed in two or three quarters (for a total of 10-15 units); (2) if a student has done little or no previous work on the topic, but the thesis adviser believes the proposed project is viable, then the program should be spread over three quarters (for a maximum of 15 units).

Successful completion of honors in Political Science requires (1) completion of all requirements for the major, (2) enrollment in Political Science 199R, a 2-unit seminar in Autumn Quarter for honors candidates, and (3) successful completion of a thesis of honors quality (GPA of ‘B+’ or better). Honors work done for credit (Political Science 199) may not be counted toward the required 45 units in political science but may be counted as all or part of the additional 15 units which relate to the student’s interest in political science.

GRADUATE PROGRAMS

Admission—Prospective graduate students should write to Graduate Admissions, the Registrar’s Office for application materials. All applicants are required to submit a sample of their writing and to take the General Test of the Graduate Record Examination. Applicants whose native language is not English must take the Test of English as a Foreign Language (TOEFL) and the Test of Spoken English (TSE). The TOEFL and TSE requirements are waived for applicants who have recently completed two or more years of study in an English-speaking country. For details concerning these tests, see the Guide to Graduate Admission. The application deadline is January 1. Admission is offered for the Autumn Quarter of the senior year and have at least a grade point average (GPA) of 3.5 in political science courses when they apply.

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Quarter only. The department expects all students to pursue a full-time program except for time devoted to teaching or research assistantships.

**MASTER OF ARTS**

Applicants for the A.M. program are selected on the basis of the same criteria as Ph.D. candidates. Financial aid is not available to applicants for the A.M. program. The department offers a terminal A.M., or the A.M. degree may be pursued as part of a joint degree program with one of the University’s professional schools. Students interested in a joint degree should apply for admission to the A.M. program in Political Science during Autumn Quarter of the first year in the Stanford professional school.

Terminal A.M. students, and doctoral candidates who wish to apply, are awarded the A.M. degree when they have met the following requirements: completion of at least three quarters of residency as a graduate student, with 45 units of credit, of which at least 25 units must be taken in political science graduate seminars of 200-level and above. Not more than 25 units of the 45-unit requirement may be taken in a single field. The student shall take at least two graduate seminars in each of two fields and at least one graduate seminar in a third field. Of the remaining 20 units, not more than 10 units of work from related departments may be accepted in lieu of a portion of the work in political science. Not more than 10 units can be taken as directed reading. Courses must be numbered above 100. A grade point average (GPA) of ‘B’ or better must be attained for directed reading and all course work.

The University’s basic requirements for the master’s degree are discussed in the “Graduate Degrees” section of this bulletin. Students receiving the A.M. degree from Stanford are not given preference for admission to the Ph.D. program. They must apply for admission in the regular manner and are subject to the same selection process as other applicants. The department does not offer a coterminous bachelor’s and master’s degree program.

**DOCTOR OF PHILOSOPHY**

The University’s basic requirements for the Ph.D. degree are discussed in the “Graduate Degrees” section of this bulletin.

Programs of study leading to the Ph.D. degree are designed by the student, in consultation with advisers and the Director of Graduate Studies, to serve his or her particular interests as well as to achieve the general department requirements. A student is recommended to the University Committee on Graduate Studies to receive the Ph.D. degree in Political Science when the following program of study has been completed:

1. The candidate for the Ph.D. degree must offer three of the following concentrations in political science: American politics, comparative politics, international relations, political theory, and public organizations. Upon petition, a special field (for example, public law, urban politics, or methodology) may be offered as a third concentration. Students concentrate on two of these areas by fulfilling, depending on the concentration, combinations of the following: written qualifying examinations, research papers, research design, course work. The requirement for the third concentration may be satisfied by taking either a written examination in that area or by offering a minimum of 10 units with a grade point average (GPA) of ‘B’ or better in the third concentration from among the formal graduate-level courses in the five divisions of the department. The third concentration cannot be satisfied by courses taken as a requirement for a first or second concentration. A third concentration in theory requires two courses in addition to the 5 units necessary to fulfill the program requirement. Completion of special concentrations may require more than 10 units of course work.

2. The Ph.D. candidate is required to demonstrate competence in a language and/or skill that is likely to be relevant to the dissertation research. The level of competence needed for successful completion of the research is determined by the student’s adviser. All candidates must complete 5 units of statistical methods or its equivalent. Students who are in the concentration of International Relations, American Politics, or Public Organizations are required to take an additional 5 units of methods. Previous instruction can be counted towards this requirement only if approved by the Director of Graduate Studies.

3. If the candidate has not completed at least one year of previous undergraduate instruction in political theory, or at least 5 quarter units of graduate political theory, he or she must take 5 quarter units of graduate instruction in political theory.
4. By the start of the fourth quarter in residence, each first-year graduate student submits to the student's adviser a statement of purpose. This statement indicates the student's proposed major concentrations of study, the courses taken and those planned to be taken to cover those fields, the student's plan for meeting language and/or skill requirements, plans for scheduling of comprehensive examinations and/or research papers, and, where possible, dissertation ideas or plans. This statement is discussed with, and must be approved by, the student's adviser. In the Autumn Quarter following completion of their first year, students are reviewed at a regular meeting of the department faculty. The main purposes of this procedure are, in order of importance: to advise and assist the student to realize his or her educational goals; to provide an incentive for clarifying goals and for identifying ways to achieve them; and to facilitate assessment of progress toward the degree.

5. When both the student and adviser feel that the student is ready, he or she takes comprehensive examinations in two concentrations and completes one research paper. Comprehensive examinations are offered at the discretion of the faculty. If scheduled, they are given in the third week of Autumn and Winter Quarters, and in the seventh week of Spring Quarter. Students should normally expect to complete these examinations and the research paper by the end of their second year.

6. Upon completion of one research paper and two comprehensive exams in his or her two major concentrations, the student files an Application for Admission to Candidacy for the Ph.D. which details program plans and records. This document, along with a student's examination performance, is reviewed by the faculty at a regular meeting. If it is approved, the student is advanced to candidacy. Students must be approved to candidacy by the completion of their sixth quarter as a full-time student.

7. During the third year, a formal dissertation proposal is submitted by the student to a thesis committee of three faculty members, including the principal adviser.

8. A candidate for the Ph.D. in Political Science is required to serve as a teaching assistant (TA) in the department for a minimum of two quarters.

9. Doctoral candidates who apply for the A.M. degree are awarded that degree on completion of the requirements outlined in the description of the A.M. program.

10. The candidate must pass the University oral examination on the area of the dissertation, at a time, after the passing of the written comprehensive examinations, suggested by the candidate's dissertation committee.

11. The candidate must complete a dissertation satisfactory to the Dissertation Reading Committee and the University Committee on Graduate Studies.

**Ph.D. MINOR**

Candidates in other departments offering a minor in Political Science select two concentrations in political science in consultation with the Director of Graduate Studies and submit to her or him a program of study for approval. Written approval for the program must be obtained from the Director of Graduate Studies before application for doctoral candidacy. Students are required to complete at least 20 units in political science courses. Two of these courses, in separate concentrations of political science, must be 200 level and above. All grades must be a GPA of 'B' or better. Candidates may be examined in their concentrations in the general oral examination by a member of the Department of Political Science, chosen in consultation with the Director of Graduate Studies.

**WEST REFERENCE ROOM**

The department maintains, for its faculty, guests, graduate students, and advanced undergraduates, a small reference room that holds political science journals, handbooks, books useful in preparing for Ph.D. examinations, and other materials. Access to West Reference Room is restricted to eligible key holders.

**COURSES**

(WIM) indicates that the course meets the Writing in the major requirements.

*Summer Quarter*—During Summer Quarter, the Department of Political Science offers a variety of courses and seminars. The specific offerings depend on the faculty available during the Summer Quarter.

The department uses the following course numbering system:

- 1-99 Introductory Courses
- 100-199 Advanced Courses and Undergraduate Seminars (at the instructor's discretion, graduate students may enroll and be given graduate credit when additional work is assigned and the appropriate department Graduate Credit Authorization form is completed)
- 200-299 Graduate-Undergraduate Seminars (principally for graduate students; at the instructor's discretion, undergraduates may be admitted)
- 300-400 Graduate Seminars

Course information is accurate when the Stanford Bulletin goes to press; however, students...
should be aware that there may be changes and should check the quarterly Time Schedule for up-to-date information.

INTRODUCTORY

1. Major Issues of American Public Policy—Alternative public policies in selected areas, including control of monopoly, poverty, and foreign policy. The political process: the influence of cultural, economic, and political factors and the location of political power in determination of public policy. GER:3b (DR:9)
   5 units, Aut (Brady)

10. American National Government—The role and importance of the ideal of democracy in the evolution of the American political system. American political institutions (the Presidency, Congress, and the Court) and political processes (the formation of political attitudes and voting) are examined against the backdrop of American culture and political history. Major areas of public policy in the current practice of the ideal of democracy. GER:3b (DR:9)
   5 units, Spr (Maddox) given 1998-99

20. Issues in Comparative Politics: Power, Policy, and Industrial Development—How does industrialization affect a country's political system regarding the extent and range of central government power? How do government policies influence patterns of industrial development? Hypotheses are tested by case studies of the political history of countries with different industrialization experiences (Britian, U.S., Germany, Soviet Union, China, Japan, S. Africa, and Algeria). GER:3b (DR:9)
   5 units, Win (Abernathy)

25. Colonialism and Nationalism in the Third World—Comparative historical analysis of European exploration, conquest, and colonial rule in Latin America, the Caribbean, Africa, and Asia. Factors affecting the timing, character, and effectiveness of nationalist movements in the Third World. The impact of colonialism on postcolonial political and economic systems.
   5 units (Abernethy) given 1998-99

35. International Politics—(Same as 135.) Approaches to the study of world politics including realism, liberalism, and decision-making theories. WW I, the nuclear weapons debate, and contemporary and economic problems. The normative and policy implications of different theories. GER:3b (DR:9)
   5 units, Aut (Krasner)

50. The Constitution and Race—(Enroll in History 61.)
   5 units, Spr (Rakove)

51D. Introduction to Political Philosophy—(Enroll in Philosophy 30, Public Policy 103A.)
   5 units, Aut (Gruen)

60. The American Dream—Critical analysis of America's dominant ideology, the American Dream, as experienced by women, minorities, labor, Indians, and immigrants. GER:3b,4b (DR:3 or 9)
   5 units, Win (Manley)

99F. Stanford Introductory Seminar: The Evolution of Voting Rights in the U.S.—Preference to sophomores. The evolution of voting rights in the U.S. from the enactment of the Constitution of 1787 to the present. Emphasis is on identifying conditions under which expansion was possible as a result of the removal of barriers (property ownership, racial and ethnic discrimination, gender bias, and language facility). Current issues in the interpretation and implementation of the provisions of the Voting Rights Act. Implications of the evolution of voting rights in the U.S. for understanding democratic theory and American political development.
   5 units, Spr (Fraga)

   5 units, Aut (Moe)

99P. Stanford Introductory Seminar: Institutions and Development— Preference to sophomores. Markets are necessary but not sufficient conditions for economic, social, and political development. Why are markets necessary? Why are they not enough? What else is needed? Theoretical works (North, Stiglitz, deSoto, Dahl, Huntington, Fukuyama, etc.) and empirical studies of E. Asian, Latin American, Russian cases.
   5 units, Spr (Packenham)

   5 units, Spr (Tunick)

ADVANCED UNDERGRADUATE

Advanced undergraduate courses are open to undergraduates who have the necessary prerequisites, and to graduates where advisable. Undergraduate seminars have limited enrollments and
admission generally requires consent of instructor. They are intended for juniors and seniors, but may admit graduate students. Sign-up sheets for undergraduate seminars are posted in the department office at class list sign-up time. Undergraduates should also consider the graduate-undergraduate seminars, numbered 200-299, in the next general section.

GENERAL
100A. Introduction to Political Data Analysis—(Same as 200A.) Applications of probability and statistical methods in political science.
5 units, Aut (Rivers)

100B. Statistical Modeling for Political Science—(Same as 200B.) Specification and estimation of statistical models of political processes. Focuses on the multiple regression model and its extensions.
5 units, Win (Jackman)

POLITICAL ORGANIZATIONS
The courses and seminars listed below are open to all undergraduates in the University regardless of major. There are no prerequisites. There are no formal course sequences in public administration.

101P. Politics and Public Policy—(Same as Public Policy 101.) The domestic policy-making process, emphasizing how elected officials, bureaucrats, and interest groups shape government policies in various areas including tax, environmental, and social-welfare policy, given their goals and available tactics. How public policies are formulated and implemented. The results of this process using equity and efficiency criteria. Prerequisite: 1 or 10.
5 units, Spr (Weingast)

104. Seminar: Urban Policy—Issues of public finance, housing, education, transportation, and crime in major metropolitan areas in the U.S. Students are placed in an internship in local government and contribute to a policy report being written by a local government agency. (WIM)
5 units, Win (Fraga)

109. Directed Reading/Research in Political Organizations—Advanced individual study in public administration.
any quarter (Staff)

COMPARATIVE POLITICS
Undergraduate courses and seminars in comparative politics generally fall into two groups: those dealing with a particular country or region, and those dealing with major political problems or processes. Students concentrating in comparative politics are encouraged to take courses from both groups, and are also urged to do course work in more than one country or region.

111D. British Politics—Britain has experienced a remarkable cycle of change in its politics the last two decades. After a prolonged period of political and economic instability, Prime Minister Thatcher and her Conservative Party established in 1979 a one-party dominance that persisted until 1997. Changes in British policy, and the revival of political competition in the years ahead. GER:3b (DR:9)
5 units, Spr (Dorfman)

113P. Political Economy of Latin American Development—Changing patterns of state-market relations in Latin America in the 1980s and '90s. What has happened and why; effects on economic, social, and political development; implications for normative and positive theories of development. GER:3b (DR:9)
5 units, Win (Packerham)

114K. Political Economy of Development—Introduction to major theories of political development, emphasizing the interplay between economic and political processes, and national and international factors from Latin America, Africa, and Asia. Cases include Brazil, China, Cuba, El Salvador, India, Taiwan, Nigeria, and Venezuela.
5 units (Karl) not given 1997-98

115. Chinese Politics—The politics of the People's Republic of China. The origins of the Communist revolution, the institutionalization and consequences of Communist rule and attempts to reform the system since 1978. GER:3b,4a (DR:2 or 9)
5 units, Win (Oi)

115J. Political Economy of Reform in China—The policies and consequences of the reform process in China since 1978. Emphasis is on changes in institutional structure and their affect on political behavior at the elite and grass roots levels.
5 units (Oi) given 1998-99

116A. Politics and Society in Europe (I) 1494-1900—Europe is characterized by a mixture of unity and diversity: common beliefs, practices, and institutions (“European Civilizations”), a history of political division (“the European State System”), and armed conflict (“European Civil Wars,” ending in 1945). Whether historical diversity has diminished in recent decades and, if so, whether this convergence can be attributed to the process of regional integration.
5 units, Spr (Staff)

116B. European Politics and Society (II)—Analysis of efforts aimed at rebuilding Western Europe after WW I. The rise of Fascism and National Socialism during the interwar period, national reconstruction, and regional integration in the aftermath of WW II. Emphasis is on initial differences and eventual convergences in party and interest group systems, political regimes, and public policies, especially the emergence of the modern welfare state. Lectures/discussion sessions. Substantial reading.
5 units (Schmitter) given 1998-99

116L. Social Foundations of Democracy—(Same as 216L.) Social, cultural, political, economic, and
international factors favorable to the development and consolidation of democracy in historical and comparative perspective. Worldwide development and the reemergence of democracy in the past decade. Case studies of the individual country's experiences with democracy.

5 units (Diamond) given 1998-99

117H. Peasant Politics—The social, economic, and political organization of different “peasantries” and their insertion into national political life, including subsistence farmers, small holders, and landless agricultural workers. The role of the peasantry in the foundation of national political regimes (i.e., democracy, communism, and authoritarianism). The links to agricultural modernization, and the formation of varied national political institutions. The role of rural politics in the process of economic development, with cases from Latin America and Africa. Peasant political mobilization (electoral and labor-union participation, forms of resistance, and peasant rebellion and revolution).

5 units, Spr (Staff)

118A. Political Change in Tropical Africa—The colonial situation, growth of nationalism, achievement of political independence, ethnic patterns in new states, civilian and military leadership, role of party and bureaucracy, movements for electoral democracy, succession struggles and civil war, problems in stimulating economic development, and efforts at regional integration. GER:3b,4a (DR:2 or 9)

5 units, Spr (Abernethy)

118B. The Politics of Race and Class in Southern Africa—The political history of the region’s 10 countries, emphasizing relations among racial and ethnic groups. Diplomatic, economic, and military interactions among these states. The impact of movements, corporations, and international organizations based outside the region. Domestic politics in South Africa, emphasizing struggles over the character of post-apartheid society.

5 units (Abernethy) alternate years, given 1998-99

119M. Seminar: Revolutions—While “revolutions” mark important turning points in the modern world, the causes and consequences of revolutions are poorly understood. Given the limited number of cases, theorizing about revolutions is underdeveloped, underspecified, and outdated. Seeks a study of revolutions as a legitimate focus for theoretical inquiry by reviewing structural, institutional, cultural, and rational choice approaches. Case studies focus on testing and applying recent theories of political change to classic revolutionary cases. (WIM)

5 units, Spr (McFaul)

120D. Seminar: Foreign Policies of the Post-Soviet States—(Same as 220D.) The range of variables shaping a state’s foreign policy (e.g., geopolitics, domestic politics, political culture, personality, perceived historical tradition, and economic constraints and incentives). The evolving foreign policies and policy disputes in Russia, Ukraine, the Transcaucasus, and Central Asia in the 1990s.

5 units, Aut (Dallin)

121M. Russian Politics—The evolution of the present Russian political system. The Soviet system, tracing its collapse. Attempts at reform of the Soviet system, beginning with Khrushchev and ending with Gorbachev. The emergence of Russian post-communist political institutions, including the Russian federal system, executive-legislative relations, political parties, and lobbies. The relationship between political and economic reform in post-communist Russia. GER:3b (DR:9)

5 units, Win (McFaul)

122. Seminar: Decolonization in Asia and Africa, 1940-80—Comparison of the dynamics of decolonization and “new state” formation. Factors affecting the timing, speed, nature, and extent of violence in the decolonization process, and the character of the regime ruling the new state. Case studies: India/Pakistan, Indonesia, Indochina, Ghana, Ivory Coast, Algeria, Zambia, and Zimbabwe. (WIM)

5 units, Spr (Abernethy)

124. Seminar: States and Markets in Latin American Development—Case studies, comparative analyses, and theoretical readings explore patterns of state-market relations in Latin America and their consequences for economic, social, and political development. Prerequisite: consent of instructor.

5 units (Packenham) not given 1997-98

125. The Rise of Industrial Asia—(Same as 225.) The political, economic, social, and cultural aspects of industrial development and change in Asia as a region. Prerequisite: consent of instructors. GER:3b (DR:9)

5 units, Aut (Oi, Oksenberg, Raphael, Rohlen)

126K. Seminar: The United States and Central America—(Same as Latin American Studies 182.) The crisis of development in Central America and the challenge it has posed for U.S. policy towards Latin America. Emphasis is on the historic roots of the crisis and the emergence of specific policy dilemmas in the issue areas of democratization, national security peace negotiations, and human rights.

5 units (Karl) not given 1997-98

127T. Seminar: Evaluating East European Transitions—Theoretical exploration of transitions to democracy in Eastern Europe. To what extent can we account for “successes” (Poland, Czech Republic, Slovenia) and “failures” (Slovakia, Belarus, Albania) in terms of economic factors, international influences, domestic political leadership, or cultural
al differences? Are today's "successes" likely to be tomorrow's "failures"?

5 units, Spr (Staff)

129. Directed Reading/Research in Comparative Politics—Advanced individual study in comparative politics.

any quarter (Staff)

INTERNATIONAL RELATIONS

Students interested in international relations are encouraged to take Political Science 35, International Politics. While not a formal prerequisite for many of the courses listed below, 35 provides a desirable background for more advanced work.

The courses in international relations offered by the Department of Political Science can be divided into two groups: those dealing with global political, military, and economic problems; and those dealing with the foreign relations of specific nations or geographic regions. Students concentrating in international relations are encouraged to select their courses from both groups.

Students with interests in international relations are encouraged to refer to the "International Relations" section of this bulletin, which lists international relations courses in other departments.

132D. Seminar: Controversies over Foreign Aid—Debates involving official development assistance: ethical basis for aid; relative efficacy of aid, trade, private investment, and work of nongovernmental organizations; economic conditionality in structural adjustment programs; role of humanitarian relief under conditions of natural disaster, civil war, and anarchy. Group discussion and critique of students' research projects.

5 units (Abernethy) given 1998-99

133. Peace Studies—(Same as Education 173X, Psychology 165, History 154.) Interdisciplinary, dealing with the challenges of pursuing peace in a world where the sources of conflict are many and regional, ethnic, and religious antagonisms are rising. The art of creating and maintaining peace is analyzed from historical, social, psychological, and moral perspectives. Goals: to illustrate the current and potential contributions of various academic disciplines and critical analyses to the study of peace; and to prepare students to think critically and to act responsibly and effectively on behalf of peace. Eight sections: challenges, enemies, theoretical understandings, justice, security, non-violence, public peace processes, peace and you.

5 units, Spr (Bernstein, Bland, Noddings, Ross, Stedman)

134A. Strategy, War, and Politics—Traditional and modern theories on the causes of war and sources of peace. Contrasting explanations for the origins of WW I and II; alternative theories of deterrence in the nuclear age; the causes of war in the Persian Gulf, and ethnic conflicts in the post-Cold War era. GER:3b (DR:9)

5 units, Spr (Sagan)

134B. America and the World Economy—Developmental approach analyzes American foreign economic policy, centering on a historical analysis of the basic issues involved in the formation of American foreign policy. Issues: evolution of American tariff and trade policy, development of mechanisms for international monetary management, and American foreign investment policy reflected in changing political goals pursued by American central decision-makers. Prerequisite: 35 or equivalent.

5 units, Win (Goldstein)

134P. The Role of Technology in National Security—(Enroll in Engineering Economic Systems and Operations Research 193; same as 234P.)

3 units, Aut (May)

135. International Politics—See 35. Limited to students with graduate standing.

5 units, Aut (Krasner)

136P. The Role of Technology in Policy Decisions—(Enroll in Engineering-Economic systems and Operations Research 194.)

3 units, Spr (North, May)

137. Seminar: Political Psychology and International Relations—Psychological theories and international relations. Topics: Why does the U.S. military prevent gay and lesbian soldiers from defining who they are? Why were Hitler's soldiers willing to commit mass murder? Why did Saddam Hussein fight a war that he had no chance of winning? How psychological factors might affect international political outcomes. Theories of individuals, groups, organizations, and applications of those theories to various political domains. (WIM)

5 units, Spr (Belkin)

138. International Security in a Changing World—(Same as Engineering-Economic Systems and Operations Research 195.) Surveys the major international and regional security problems in the modern world. Interdisciplinary faculty lecture on the political and technical issues involved in arms control, the military legacy of the Cold War, regional security conflicts, proliferation of advanced weapons capabilities, ethnic conflicts, and peacekeeping efforts. GER:3b (DR:9)

5 units, Win (Blacker, May, Perry, Sagan)

138A. Seminar: Advanced Study in International Security—Provides undergraduates an opportunity to conduct advanced research in international security. Themes: whether prominent theories in security studies that were developed during the Cold War are appropriate today; whether metaphors and models from other disciplinary traditions (psychology, sociology, and organization theory) might be useful for the explanation of international political outcomes. Contemporary security issues: De-
mocracies do not fight each other. Is that claim accurate? Did deterrence theory in the developing world "work" during the Cold War and are smaller powers (Iraq and N. Korea) deterrollable? The international relations theory failed to account for the possibility of the end of the Cold War. How can we explain and address this? Great power responses to the spread of nuclear weapons. Is nuclear proliferation dangerous, and if so, what should be done? (WIM)

5 units, Spr (Belkin)

139. Seminar: Japanese Foreign Policy—Analysis of the origins of WW II in the Pacific; Japan's role in international security; and the U.S.-Japan trade conflict.

5 units, Aut (Okimoto)

142K. International Law—The nature and role of international law in the interaction of states. The basic principles of international law. Problems of interpretation and enforcement. The relationship between law and power. Treaties and the legal basis of diplomacy and international organizations. Law and the problem of war. Human rights under international law. Prerequisite: 35 or consent of instructor.

5 units, Win (Gaubatz)

142S. Seminar: Advanced Study in the United Nations and the Wars of the 1990s—The UN has in recent years played a lead role in conflict management. Topics: peacekeeping, the implementation of peace agreements in civil wars, humanitarian intervention, mediation, preventative diplomacy, UN reform, and relations between the U.S. and the UN. Case studies evaluate the UN's performance in preventing, managing, and resolving various wars in the 1990s including Cambodia, El Salvador, Mozambique, Rwanda, and the former Yugoslavia. (WIM)

5 units, Aut (Stedman)

143G. Seminar: Public Opinion in International Relations—The role of public opinion in the formation and conduct of foreign policy. The relationship between domestic opinion and international pressures on decision makers. The influence of democracy and democratization on international relations. Prerequisite: 35 or consent of instructor.

5 units (Gaubatz) given 1998-99

143K. Seminar: Democratic States and International Relations—The influence of democracy and democratization on international relations. The role of public opinion in the formation and conduct of foreign policy. The relationship between domestic and international constraints on democratic decision-makers. Prerequisite: 35 or consent of instructor. (WIM)

5 units, Spr (Gaubatz)

149. Directed Reading/Research in International Relations—Advanced individual study in international relations.

any quarter (Staff)

POLITICAL THEORY

Note—151A,B,C may be taken independently of one another.

151A. History of Political Thought I: Ancient, Classical, and Christian Worlds—(Same as 251A.) The changing relationship between political rule and individual achievement in Greek, Roman, and early Christian thought. Readings: Plato, Aristotle, Sophocles, Cicero, the Bible, Augustine, and Aquinas. GER:3b (DR:8)

5 units, Aut (Hansot)

151B. History of Political Thought II: Renaissance to Enlightenment—(Same as 251B.) The secularization of political thought and the development of liberal and republican ideas between the 14th and the 18th centuries. Readings from More, Hobbes, Locke, Shakespeare, Machiavelli, and Rousseau. GER:3b (DR:8)

5 units, Win (Okino)

151C. History of Political Thought III: French Revolution to the Present—(Same as 251C.) The intellectual struggles since the French Revolution regarding the possibility and desirability of founding a new, rational political authority which respects individual freedom and rights, an authority not bound by tradition. Readings: Burke, Bentham, Kant, Hegel, Marx, Melville, Mill, Nietzsche.

GER:3b (DR:8)

5 units, Spr (Jacobson)

152. Seminar: Expression and Censorship—What, if any, restrictions on pornography can be justified? Is societal resilience being strained by the "lyrics" of rap? What can the new, and viable, morality look like?

5 units, Win (Drekmeier)

153. Seminar: Utopian Political Thought—How utopias function as blueprints for social change or as thought experiments. Classical and modern utopias (Plato, More, Bellamy, Gilman, Piercy) and anti-utopias (Orwell, Le Guin, Borges). Limited enrollment. Prerequisite: consent of instructor.

5 units, Aut (Hansot)

154. Feminist Political Theory: Gender, Power, and Justice—Emphasis is on recent feminist theories. How feminist perspective complicates and enhances political thought. Types of contemporary feminist thought and the effects of men's and women's different perspectives on moral, social, and political issues.

5 units, Win (Yuracko)

155T. Hegel's Political Philosophy—Critical reading of Hegel's Philosophy of Right, emphasizing his concept of freedom, criticism of Kantian morality,
and distinction between state and civil society. Aim is a lucid account of Hegel's text, and an understanding of its relevance to current controversies in political theory. Additional readings in Aristotle, Kant, and other works by Hegel.

5 units, Spr (Tunick)

156. Seminar: Punishment—Central concepts of political theory (authority, freedom, justice, obligation) are considered by focusing on problems raised by legal punishment: By what right does the state punish? For what actions is it legitimate to punish? Can punishment be just in an unjust society? Why punish at all? Readings: political theory, case law, literature, empirical studies, films. (WIM)

5 units, Spr (Tunick)

161S. Seminar: Democratic Theory—The major questions in modern democratic theory, including obedience to authority, alienation, participatory democracy, and political tolerance.

5 units (Sniderman) not given 1997-98

162. Seminar: Capitalism and Democracy—Attacks on and defense of the workings of the American political economy, emphasizing competing theories of democracy.

5 units, Win (Manley)

162M. Research Seminar: The American Dream—Open to juniors and seniors. The American dream in American history. Weekly meetings discuss readings and individual research projects. Prerequisite: 60 or consent of instructor.

5 units, Spr (Manley)


5 units, Spr (Manley)

169. Directed Reading/Research in Political Theory—Advanced individual study in political theory. any quarter (Staff)

AMERICAN POLITICS

170. Judicial Politics and Constitutional Law: Interpreting the Constitution—Interaction of law and politics, and the role of the U.S. Supreme Court in the political system generally. Theories of constitutional interpretation, focusing on major court cases dealing with the proper role of the court, economic and substantive due process, federalism, property takings, and criminal due process, GER:3b (DR:9)

5 units, Aut (Barker)

171. Judicial Politics and Constitutional Law: Civil Liberties—Role and participation of courts, primarily the U.S. Supreme Court, in public policy making and the political system. Judicial activity in civil liberty areas (religious liberty, free expression, race and sex discrimination, political participation, and rights of persons accused of crime). Prerequisites: 10 or equivalent, and sophomore standing.

5 units, Win (Barker)

176. Seminar: The Supreme Court—Intensive study of the U.S. Supreme Court and its role in the governing system. Topics: the court as a political-legal institution, judicial recruitment and selection, nature and dynamics of judicial decision-making in individual and collegial contexts, and the differential role and responsiveness of the court as compared to other governing institutions. Prerequisites: 170 or 171 and junior standing, or consent of instructor.

5 units (Staff) given 1998-99

177. Seminar: Courts, Politics, and Public Policy—The role and interaction of courts with other political institutions and interests in the formulation and implementation of public policy. Prerequisites: 170 or 171 and junior standing, or consent of instructor.

5 units, Win (Barker)

178. Environmental Policy and Law—(Enroll in Human Biology 125.)

5 units, Spr (Rosencranz)

178R. Natural Resources Policy and Law—(Enroll in Human Biology 131.)

5 units, Win (Rosencranz)

180R. Global Environment Policy—(Enroll in Human Biology 135.)

5 units, Aut (Rosencranz)

181. African Americans and the Political System—African Americans as political actors and the development and use of political resources as the means to achieve policy objectives. Emphasis is on the role and differential responsiveness of governing institutions to concerns of African Americans.

5 units, Spr (Rosencranz)

182F. Introduction to American Law—(Same as American Studies 179, Law 106.) American law for undergraduates. The structure of the American legal system, including the courts; American legal culture; the legal profession and its social role, the scope and reach of the legal system, the background and impact of legal regulation, the relationship between the American legal system and American society in general. GER:3b (DR:9)

5 units, Aut (Friedman)

and localities allies or competitors? Comparisons with other federal regimes.

5 units, Win (Maddox)

184. Seminar: Issues of Representation in American Politics—Arguments and examples of how the mass citizenry and organized interests are represented in American politics and the policy making process. Focus is on problems of representations in controversies over social and economic policies that evoke economic and ethic cleavages in society. Problems of minority representation, including a comparison of the issues confronting Asian American, Chicano/a, Native American, and African American groups.

5 units, Win (Wong)


5 units (Wong) given 1998-99

186. Urban Politics—Introduces the major actors, institutions, processes, and policies of sub-state government in the U.S., focusing primarily on city general-purpose governments through a comparative examination of historical and contemporary politics. Issues are related to federalism, representation, voting, race, poverty, housing, and finances.

GER:3b (DR:9)

5 units, Win (Fraga)


4 units, Aut (Kirst, Tyack)

187. Introduction to the Politics of Education—(Enroll in Education 220B.)

4 units, Win (Kirst)

188. Public Policy of Bureaucracy—The political and institutional determinants of bureaucratic policymaking: why agencies choose one policy instead of another; why agency structure and process is so complex. Bureaucracy in the larger political context, (the president, Congress, the courts, and interest groups). Applications: regulation of the environment, civil rights, labor relations, product safety, and nuclear power. The bureaucracy's role in a democracy: is the bureaucracy sufficiently responsive to the public?

5 units, Win (Kirst) not given 1997-98

189M. Seminar: Congress and Congressional Policy-Making—The structure and operation of Congress and the implications for public policy. The various influences on the decisions of legislators, (electoral concerns, constituency pressure, formal and informal congressional norms, and policy preferences). The influence of institutions such as the committee system, political parties, and congressional leadership on policy outcomes.

5 units, Win (Maddox)

190G. Seminar: American Politics, Policy, and the New Institutionalism(s)—Examines substantive and theoretical questions on American political institutions (Congress and the Presidency), public policy, and the policy making process. How institutions structure politics, with examples of substantive policy outcomes from areas such as pensions, urban poverty, environment, and welfare.

5 units, Win (Staff)

192. Seminar: Politics of Race and Ethnicity in the United States—Examines the historical and contemporary politics of selected communities of color to comprehensively understand American political development and the important issues in current American politics. Issues common to communities of color (educational opportunity, vote dilution, and immigration). Participation in a class debate on affirmative action required.

5 units (Fraga) given 1998-99

193. Politics by the Numbers—Analysis of the uses of statistics in political argument and in political science. Elementary statistical concepts (e.g., research design, sampling, correlation, inference, and threats to validity). The "political" uses of statistics in settings such polling data in political campaigns and evaluating public policy (e.g., education, welfare, the environment). Research and analysis paper.

5 units, Spr (Jackman)

194C. Political Communication—(Enroll in Communication 160/260.)

4 units (Staff) not given 1997-98


(WIM)

5 units, Spr (Rivers)

195. The Politics of Immigration—Analysis of the sources of contemporary immigration controversies in the U.S. and the politics of immigration policy making. Topics: the migration process, the labor market and public welfare effects of migration, the making of immigration law and policies and anti-immigrant backlash. Cross-national comparisons of immigration politics in N. America, Western Europe, and Australia.

5 units, Spr (Wong)

196. Issues of Race in American Politics—Surveys the forms that racism takes in contemporary American political thinking, emphasizing the connections, if any, between central values in the American political tradition such as self-reliance and individualism, attitudes toward Blacks, and ideas about racial policies. Recent, large scale surveys of
the opinions and attitudes of Americans. GER:3b (DR:9)
5 units, Aut (Sniderman)

197. Seminar: Prejudice, Politics, and Group Conflict in Italy—Original survey materials. The new force of prejudice and racism shaping politics in contemporary Europe.
5 units (Sniderman) not given 1997-98

198. Directed Reading/Research in American Politics—Advanced individual study in politics. Prerequisite: 10 or equivalent.
any quarter (Staff)

199A,B,C. Senior Project—Students conduct independent research work towards a senior honors thesis. Reference “Honors Program” above.
any quarter (Staff)

199R. Seminar: Senior Research Project—Required for students writing honors theses. Focuses on acquisition of research skills and development of an appropriate research design.
2 units, Aut (Staff)

GRADUATE-UNDERGRADUATE SEMINARS

Conducted as seminars or colloquia, and open to advanced undergraduates and graduates. Non-majors and majors are usually welcome, but enrollments are limited. Sign-up sheets for these courses are posted in the department office on class list sign-up days. Sheets should be checked for specific enrollment information.

GENERAL

200. Strategy in Politics—Introduction to formal theories of rational choice in political science. Basic utility, game, and social choice theory is explained and applied to topics in American, comparative, and international politics. Objectives: lay out the logical basis of rational choice methods at an accessible level, demonstrate the application of those methods.
5 units, Spr (Morrow)

200A. Introduction to Political Data Analysis—For graduate students; see 100A.
5 units, Aut (Rivers)

200B. Statistical Modeling for Political Science—For graduate students; see 100B.
5 units, Win (Jackman)

201A. Seminar: Foundations of Political Economy—(Same as Business 680.) Political economy is the study of collective decision-making and the institutions used to make and implement those decisions. Surveys the central issues and techniques in political economy and lays a foundation for original research using methods of positive political science. Topics: social choice, majority rule, strategic behavior, agendas, norms, institutions, interest groups, and lobbying. First in a three-part sequence and a prerequisite for the remaining courses. Material is somewhat technical but accessible to most graduate students in political science, economics, and business.
5 units, Aut (Diermeier)

201B. Seminar: Economic Analysis of Political Institutions—(Same as Business 681 P.) Addresses an expanded set of issues using the methods of information economics, games with incomplete information, repeated games, sequential bargaining, and rational expectations.
5 units, Win (Baron)

201C. Seminar: Applied Formal Models—Congressional Decision-Making—(Same as Business 682.) Focuses on empirical applications of formal models to the study of legislatures. Presumes students have acquired basic technical skills from 201A,B, or their equivalents. Objective: to learn how such skills can be applied to obtain a more comprehensive and systematic understanding of collective decision-making.
5 units, Spr (Krehbiel)

203. Seminar: Advanced Topics in Statistical Modeling—Possible subjects: measurement models, multidimensional scaling, multivariate analysis, causality testing, Bayesian methods, semiparametric and robust methods.
5 units, Spr (Jackman)

POLITICAL ORGANIZATIONS

206. Seminar: Politics and Organization—Provides an analytical foundation for understanding organized activity as it reflects the organization of political life. Coverage of theories is eclectic and interdisciplinary. Emphasis is on political institutions and formal organizations generally, and the norms, expectation, and routines characteristic of informal political structure.
5 units, Win (Moe)

206W. Seminar: New Economics of Organization—Survey of economic approaches to organization, emphasizing theory and application, with attention to politics.
5 units, Spr (Weingast)

207. Organizational Decision-Making—For graduate students.
5 units (Bendor) given 1998-99

209. Directed Reading in Public Administration any quarter (Staff)

COMPARATIVE POLITICS

212P. The Politics of International Cooperation and Regional Integration—Open to advanced undergraduates (by consent of instructor) and graduate students. Theory and practice of "regionalism," multilateral conflict resolution, functionalism and international organizations, the politics of free trade areas and common markets,
the emergence of international regimes and supranational institutions. Emphasizes the European Community, the North American Free Trade Act, and various experiences in Latin America.

5 units (Schmitter) not given 1997-98

214. Seminar: Comparative Interest Politics—For advanced undergraduates and graduates. A theoretical and empirical inquiry into the role played by interest association in modern politics. Emphasis is on the contrast between pluralist and corporatist systems in advanced capitalist countries, with some Latin American and other Third World cases attempting a transition to democracy. Enrollment limited. Prerequisite: consent of instructor.

5 units (Schmitter) given 1998-99

215. Graduate Seminar: Environmental Politics in the Asia/Pacific Region—Focuses on: the evolving ecology of Asia/Pacific from 1400 to the present (topography, climate, flora and fauna, and human populations); traditional patterns of managing and perceiving environmental issues; recent environmental consequences of industrialization and modern agriculture (trends in water, air, and soil quality; land use; and coastal water quality); contemporary policies of Asian countries concerning their environmental problems (improved water management and effluent discharge standards, soil conservation, auto emission controls, national energy policies, transportation policies, and policies on population growth and migration); and bureaucracies, interest groups, transitional actors, and the environmental politics of Asian/Pacific countries. Emphasis is on Japan, China, Indonesia, Thailand, India, and the small Pacific island nations. Policy making and implementational processes in the environmental area: the structures and institutions that have been established in recent years, their efficacy, and the political, economic, and cultural obstacles and inducements to implementing various environmental policies. Prerequisite: consent of instructor.

5 units, Win (Oksenberg)

215A. Graduate Seminar: Approaches to Chinese Politics—Provides bibliographic control of the major secondary literature on Chinese politics, organized around theoretical concepts and issues found in studies of the Chinese political system. Prerequisite: basic knowledge of the government and politics of post-1949 China.

5 units, Spr (Oi)

215B. Graduate Seminar: Political Economy of Reform in China—The content, process, and problems of China's post-Mao reforms. Changes in property rights, markets, credit, and the role of the state in economic development. Comparative insights about reform in the Chinese communist system that distinguishes it from the experience of regimes in Eastern Europe and the former Soviet Union. Readings in Chinese and English. Prerequisite: basic knowledge of the government and politics of post-1949 China.

5 units, Win (Oi)

215C. Graduate Seminar: Topics in Chinese Politics—In depth examination of selected topics in Chinese politics. Content varies each year.

5 units (Oi) given 1998-99

215D. Graduate Seminar: Political Change in China—Forms of participation and interest articulation in China since 1949, including peasant protests and competitive elections in rural areas.

5 units (Oi) given 1998-99

216H. Seminar: Social Movements and Political Change—Introduces graduate students to the principal approaches in the study of contemporary social movements and identifies future research paths. The relationships between contentious forms of politics are broadly defined as social movements and political change. Social movements are broadly defined as contentious and sustained forms of collective that challenge prevailing social and political institutions.

5 units, Win (Staff)

216L. Social Foundations of Democracy—For graduate students; see 116L.

5 units (Diamond) given 1999-2000

218L. Seminar: Ethnicity and Nationalism in Soviet and Post-Soviet Politics—The major theoretical approaches to the study of ethnicity and nationalism in the Soviet system and how they attempt to explain the strategies and institutions utilized by the Soviet state to manage its "nationality problem;" the impact of Gorbachev's reforms in precipitating national movements which contributed to the dissolution of the Soviet system; and the role of ethnicity and nationalism in the new states of the region.

5 units, Win (Lapidus)

219M. Seminar: Democratic Transitions—Comparative overview of the growth of new democratic states in the last 20 years. Structural, strategic, institutional, and cultural theories of democratization. The role of the international system and the relationship between democracy and market reforms. Regions and cases: 18th-century U.S. and Western Europe; 20th-century Latin America, southern Europe, Africa, and the former communist world.

5 units, Win (McFaul)

220D. Seminar: The Foreign Policies of the Post-Soviet States—Limited to graduate students.

5 units, Aut (Dallin)

220M. Research Seminar: Post-Communist Institutional Change—For graduate students doing research on Eastern Europe and the newly independent states of the former Soviet Union. Theories explaining institutional change in post-communist transitions. Methodologies for the study of political
and economic change in the former communist countries. Presentations of research designs or research projects in progress.

5 units (McFaul) not given 1997-98

222K. Seminar: Research on Latin America—(Same as Latin American Studies 200.) Restricted to graduate students and undergraduates preparing senior honors theses after research in Latin America. Develop and present research and prepare a field paper. Prerequisite: consent of instructor.

5 units (Karl) not given 1997-98

222T. Latin America in International and Historical Perspective—Topics on the post-independence history of Latin America, explaining the interactions between history, politics, institutions, and economic growth in the economies of the region, and placing contemporary development problems in historical perspective. Comparative analysis toward figuring what Latin America did wrong (right) or what other developing regions of the world did right (wrong). Topics: free-trade and protection, monetary stability and instability. Recommended: capitol understanding of economics.

5 units, Spr (Taylor)

223. Seminar: Japanese Politics—The primary institutions in Japanese politics (the bureaucracy, legislature, political parties, and interest groups) through the lens of the major theories that have been used to explain their structure and behavior (statism, pluralism, elitism, and network theory).

5 units, Win (Okimoto)

223M. Seminar: Political Economy of Post-Communism—The sources of the collapse of the communist states in Eastern Europe and the former Soviet Union. Issues facing the formation and consolidation of post-communist states and societies, including democratization, privatization, nationalism, and foreign relations between newly independent states. Models and historical analogues for analyzing the emergence of post-communist politics. Prerequisite: 121M. (WIM)

5 units, Spr (McFaul)

223T. Seminar: Parties and Party Systems in Western Europe—Critical evaluation of theoretical work on the causes and effects of party behavior and party system dynamics. What determines the shape of party systems, the behavior of individual parties, and the impact of parties and party systems on public policy, drawing on empirical work on Western Europe.

5 units, Win (Staff)

224. Seminar: States and Markets in Development—For advanced undergraduates and graduate students. Research-oriented. Emphasis is on recent trends toward economic liberalization in policies and models of national development in Latin America and other areas.

5 units, Spr (Packenham)

224K. Seminar: Contemporary Issues in Latin America—(Same as Latin American Studies 251.) Restricted to A.M. and Ph.D. students. Oriented towards defining individual research on contemporary Latin America.

5 units, Win (Karl, Morrison)

225. The Rise of Industrial Asia—See 125. Limited to graduate students.

5 units, Au (Oi, Oksenberg, Raphael, Rohlen)

226A,B. Workshop on Brazil—(Same as Latin American Studies 197A,B.) Inquiry into the present relationship between economy, society, and politics in Brazil. Social trends, economic performance, and cultural issues. Problems surrounding the consolidation of democracy as they are to affect and are affected by the current government of Fernando Henrique Cardoso. Stanford faculty and visiting scholars from Brazil. Meets once a week both quarters, but can be taken independently. Prerequisite: consent of instructor.

5 units (Schmitter) not given 1997-98

227. Seminar: Democratization—East, West, and South—For graduate students; advanced undergraduates by consent of instructor. Comparison of political changes possibly leading to more democratic institutions in Latin America, with reference to Southern and Eastern Europe and perhaps Asia: differences in previous regimes and economic systems; levels of development and international context; modes of demise and efforts at reform; eventual institutions and practices.

5 units (Schmitter) not given 1997-98

227D. Seminar: Consolidating Democracy—Problems and processes in consolidating new or recently restored democracies. Examples and illustrations from Europe, Asia, Africa, and Latin America, with emphasis on the new democracies of the post-1974, “third wave” period. The nature of consolidation and its relationship to legitimation; legacies of authoritarian rule and the transition; design of political institutions; (re)building political parties; crafting agendas and constructing coalitions; problems of democratic governance (delivering accountability, a rule of law, electoral integrity); the relationship between consolidation and structural economic reform, managing ethnic and regional conflict; establishing civilian control over the military; developing a democratic civil society and political culture; and the role of international actors. Students write a major research paper on an individual country.

5 units (Diamond) given 1998-99

229. Directed Reading in Comparative Politics any quarter (Staff)

INTERNATIONAL RELATIONS

234B. International Institutions—The origins and function of security and economic international institutions in the contemporary world. Regional
trade organizations, multilateral organizations such as the IMF, GATT, and EC.

5 units (Goldstein) given 1998-99

234P. The Role of Technology in National Security—(Enroll in Engineering-Economic Systems and Operations Research 193; same as 134P.)

3 units, Aut (May)

240. Seminar: Security in an Insecure World—The revolution in international and regional security relations occasioned by the collapse of Soviet power, German unification, and the rise of globalism in Japan and China. Emphasis is on the problem of nuclear weapons proliferation, regional conflicts and arms races, the rising incidence of intra-state and transnational violence, and the prospects for limitations of collective military action and cooperative security. Regional foci include Russia and newly independent states, the New Europe, and the Asia-Pacific region.

5 units (Blacker) not given 1997-98

241. Seminar: Issues in International Political Economy—Open to master's students and to advanced undergraduates. Critical examination of the major theories which shed light on contemporary issues of global economic relations.

5 units, Win (Goldstein)

241B. Seminar: Decision Making in U.S. Foreign Policy—(Same as International Policy Studies 208.) Priority given to students in International Policy Studies. The formal and informal processes involved in U.S. foreign policy decision-making. The formation, conduct, and implementation of policy, with reference to the role of the President and Executive Branch agencies. Theoretical and analytical perspectives are supplemented by case studies. Preparation of policy memorandum and substantial research paper or take-home final.

5 units, Aut, Spr (Blacker)

243A. Graduate Seminar: International Relations Theory—Introduction to contemporary theories of international politics. Micro and macro approaches to the study of conflict and cooperation in world politics, including the work of Carr, Waltz, Gilpin, Keohane, and Bueno de Mesquita. Format emphasizes student oral and written presentation of assigned readings.

5 units, Aut (Krasner)

243B. Seminar: Theoretical Issues in International Security—Critical examination of the major theories concerned with international security. Theories at a variety of levels of analysis (systemic, domestic politics, organizational, and psychological). Short research design papers.

5 units, Spr (Gaubatz)

243C. Seminar: Theoretical Issues in International Political Economy—For Ph.D. students only. Major contemporary theories affecting global economic relations and related national policies.

5 units, Win (Goldstein)

243G. Seminar: Political Theory and International Relations—The foundations of modern international relations theory. The development of ideas about power, legitimacy, and the conduct of international relations. Readings from Thucydides, Machiavelli, Hobbes, Rousseau, Kant, Grotius, Niebuhr, Arendt, and others.

5 units (Gaubatz) not given 1997-98


5 units, Win (Rice)

246J. Seminar: The Organization of the Contemporary World System—Political Economy and Culture—The transformation of the world system in the contemporary period and its current economic, political, and cultural organization. Topics: forms of economic "globalization;" emergence of elements of a world society and political culture; effects upon political organization (e.g., the state), domestic politics, and collective identity (e.g., the alleged "new tribalism"); the relationship between economic, political, and cultural features of global integration (and disintegration).

5 units, Win (Jepperson)


5 units (Gaubatz) given 1998-99

249. Directed Reading in International Relations

any quarter (Staff)

POLITICAL THEORY

Graduate students in Political Theory should also see courses numbered 150-169.

251A. History of Political Thought I: Ancient, Classical, and Christian World—See 151A. Limited to graduate students.

5 units, Aut (Hansot)

251B. History of Political Thought II: Renaissance to Enlightenment—See 151B. Limited to graduate students.

5 units, Win (Okin)

251C. History of Political Thought III: French Revolution to the Present—See 151C. Limited to graduate students.

5 units, Spr (Jacobson)

255. Seminar: Political Theory and Literature—The political art of Albert Camus (1913-1960). One of the most influential writers of the 20th century,
philosopher by training, he combined careers as a journalist, dramatist, novelist, short story writer, and essayist. In 1957, he received the Nobel Prize for literature. (In English)  
5 units, Spr (Jacobson)

258D. Introduction to French Philosophy: From 1943 to the Present—(Enroll in French and Italian 254E.)  
3-4 units, Spr (Dupuy)

266. Seminar: Gender and Political Theory—Reads/analyzes major works and parts of works from the Western tradition of political thought, viewing them through the prism of gender. The ideological roots of inequality between the sexes. Ways in which assumptions about sexual difference have shaped the essential concepts of our tradition, including reason, nature, politics, justice, and the separation of public from private life. Compares different and sometimes contrasting interpretations of the primary works read. Enrollment limited. Prerequisite: a course in political theory.  
5 units (Okin) not given 1997-98

267. Gender, Development, and Women’s Organizing in International Perspective—Seminar on the intersections of gender and development theory and practice. The evolution of development theory from modernization to neoliberal and the parallel growth of feminist critiques. The effects of specific economic, social, educational, and environmental development policies on women, and women’s activism around these policies at the national and international levels. Examples from the developing regions: Asia, Africa, Latin America, and the Middle East.  
5 units, Spr (Okin)

268. Seminar: Contemporary Theories of Justice—Social and political justice. Facilitates understanding of the major contemporary debates in political theory. Major recent works that develop principles of justice and the political arrangements that best satisfy their requirements.  
5 units, Win (Okin)

269. Directed Reading in Political Theory  
any quarter (Staff)

AMERICAN POLITICS

272R. Graduate Colloquium: Creating the American Republic—(Enroll in History 372.)  
4-5 units, Win (Rakove)

290G. Graduate Seminar: American Political Development and the New Institutionalism(s)—Overview of theoretical approaches to and substantive questions of U.S. political institutions, emphasizing American political development. The new institutionalism(s) scholarship is used to analyze political institutions and their effects on outcomes. Why politics is a process taking place over time and how an investigation of temporal processes can inform the political analysis. Readings integrate theoretical, methodological, and substantive concerns.  
5 units, Spr (Staff)

291F. Seminar: Urban Politics and Policy—Graduate and undergraduate. The major theoretical approaches used in the analysis of urban politics and policy. Assesses fundamental conclusions about American politics reached by urban scholars as to how subsequent interpretations continue to set the context for scholarly debate and an understanding about American political development generally.  
5 units (Fraga) given 1998-99

292A. Graduate Seminar: American Political Institutions—Theories of American politics, focusing on Congress, the presidency, the bureaucracy, and the courts.  
5 units, Aut (Moe)

292B. Graduate Seminar: Topics in American Political Behavior—For graduate students with some background in American politics embarking on their own research. Current research in American politics, emphasizing political behavior and public opinion. Possible topics: uncertainty and ambivalence in political attitudes, heterogeneity in public opinion, the structure of American political ideology, political learning, the media as a determinant of public opinion, and links between public opinion and public policy.  
5 units, Win (Jackman)

292C. Research Seminar in American Politics—Students undertake supervised research in American politics and political behavior, producing a research proposal, and conducting research leading to the completion of a significant scholarly paper. Corequisites: 292A,B.  
5 units, Spr (Rivers)

292D. Research Seminar in American Politics—Students undertake supervised research in American politics and political behavior, producing a research proposal and conducting research leading to the completion of a significant scholarly paper. Prerequisites: 292A,B,C.  
5 units, Aut (Rivers)

294. Graduate Seminar: Representation of Racial and Ethnic Minorities—Theories of minority representation. The application of these theories to the study of current controversies in the politics of race and ethnicity. Topics: legislative representation and districting, individual and group advocacy, interest group rights, collective action, and multi-ethnic coalitions.  
5 units, Spr (Wong)

296. Seminar: Racial and Ethnic Politics in the U.S.—Focuses on the evolution of racial and ethnic politics in the U.S., examining the political development of the American policy generally. Goal: the construction of a comprehensive theory of Ameri-
can political development which can incorporate race and ethnicity.

5 units, Spr (Fraga)

297. Graduate Seminar: The Political Economy of Immigration—The theoretical and empirical literature on migration politics and the economic causes and effects of migration. The political economy of American immigration in comparative perspective. The immigration dilemmas of governments in Western Europe, Asia, and Australia.

5 units, Win (Wong)

298. Directed Reading in American Politics
   any quarter (Staff)

GRADUATE SEMINARS

Seminars numbered 300 and above are limited to graduate students. Instructors should be consulted before enrolling.

300. Thesis
   any quarter (Staff)

311. Seminar: Comparative Political Analysis—For Political Science Ph.D. candidates. Required for all students with comparative politics as a first or second concentration. Qualified Ph.D. candidates in other departments and A.M candidates in Political Science may be admitted with consent of the instructors. Enrollment limited to 12.

5 units, Aut (Abernethy)

313P. Seminar: Political Economy of Latin American Development—Theoretical and policy approaches to Latin American development. Emphasizes issues raised and positive and normative theories in use since the economic crises of the 1980s.

5 units, Aut (Packenham)

314K. Seminar: Political Economy of Development—Addresses major development theories in the area of comparative politics, emphasizing the interplay between global and domestic factors, and economics and politics in the developing world.

5 units (Karl) not given 1997-98

316. Seminar: Comparative Demoralization—Latin America and other Regions—Critical issues of democracy, its definition, problems of transition and consolidation, and comparison. The relationship between democracy and the military, the economy, and the interstate system.

5 units, Win (Karl)


5 units, Win (Packenham)

325. Seminar: Institutional Change and Development—What causes institutions to change? Crisis, ideas and ideologies, political organizations and leadership, social groups and movements, world culture? The recent world-wide trend toward more market-oriented, less statist models and policies of development.

5 units (Packenham) given 1998-99

340. Seminar: New Approaches to International Security—Innovative interdisciplinary approaches to security from the political science, sociology, anthropology, history, and engineering perspectives. Issues relating to war, nationalism, ethnic conflict, conflict resolution, democratization, and sustainable development. Approaches and issues are related to changing understandings of international security and conflicting disciplinary assumptions and methodologies.

5 units, Aut (Eden)

343A,B,C. Research Seminar: International Security and Social Science—Advanced graduate students, faculty, and visitors present current research on contemporary problems in international security.

1 unit, Aut, Win, Spr (Eden, Sagan)

350. Mind, Action, and Rationality—(Same as Philosophy 373.) Topic: the intersection of research in philosophy and the social sciences on basic issues about agency and practical reason. Prerequisite: graduate standing on consent of instructor.

3 units (Bratman, Ferejohn)

not given 1997-98

380A,B,C. Workshop on Political Economy

5 units, not given 1997-98

401. Seminar: Graduate Orientation—Open to first-year graduate students in Political Science.

1 unit, Aut (Staff)

OVERSEAS STUDIES

Courses approved for the Political Science major and taught overseas can be found in the "Overseas Studies" section of this bulletin, or in the Overseas Studies office, T26 Sweet Hall.

MORRISON INSTITUTE
FOR POPULATION AND RESOURCE STUDIES

Faculty: (Director) Marcus W. Feldman (Biological Sciences); Carl Djerassi (Chemistry), William Durham (Anthropology), Paul R. Ehrlich (Biological Sciences), Lawrence H. Gould (Economics, and Institute for International Studies), Mary Lake Polan (Gynecology and Obstetrics), Scott Rozelle (Economics), Shripad Tuljapurkar (Consulting Professor)
Although Stanford University does not have a formal degree program in population studies, it does have scholars of international reputation in such specialties as demographic history, demographic methods, economic demography, epidemiology, population biology, population genetics, and the sociology and anthropology of populations.

The Morrison Institute for Population and Resource Studies is an interdisciplinary group serving three major functions: (1) encouraging graduate work in population studies through fellowship grants and supervision, (2) instituting courses and seminars in population studies, and (3) bringing visiting faculty to Stanford to strengthen existing course offerings. The institute also organizes an interdisciplinary Colloquium on Population Studies to introduce upper-division undergraduates and graduate students to a variety of issues in population-related specialties.

For the convenience of interested students, offerings of population and resource studies at Stanford are listed below.

**COURSES**

**ANTHROPOLOGY**

133A,B,C. Ethics of Development in a Global Environment (EDGE)—(Same as Engineering 297A,B,C.)  
1-4 units, Aut, Win, Spr  
(Lusignan, Gupta)

161. Human Ecology: Oceanic and East Asia  
5 units, Aut (Gates)

164. Ecological Anthropology—(Same as Human Biology 134.)  
3-5 units (Durham) not given 1997-98

168. Medical Anthropology  
5 units, Aut (Barnett)

169/269. Community-Based Conservation  
3-5 units, Spr (Charnley)

181/281. Evolutionary Anthropology—(Same as Human Biology 181.)  
5 units (Durham) not given 1997-98

182. Climate and Human Evolution  
5 units (Franciscus) not given 1997-98

263. Political Ecology  
5 units (Durham) not given 1997-98

264. Advanced Ecological Anthropology  
5 units (Durham) not given 1997-98

**BIOLOGICAL SCIENCES**

117. Biology and Global Change—(Same as Earth Systems 111.)  
3 units, Win (Vitousek, Mooney)

140. Population Biology of Butterflies  
2-5 units (Ehrlich)  
alternate years, given 1998-99

142. Principles of Ecology—(Same as Geophysics 142.)  
4 units, Aut (Roughgarden)

146. Colloquium on Population Studies  
1 unit, Win (Feldman)

175H. Problems in Marine Biology  
12 units, Spr (Block, Denny, Epel, Gilly, Levine, Powers, Somero, S. Thompson, Watanabe)

216. Ecosystem Ecology and Global Biogeochromistry  
3 units (Vitousek)  
alternate years, given 1998-99

383. Seminar in Population Genetics  
1-3 units, Aut, Win, Spr (Feldman)

384. Seminar in Theoretical Ecology—(Same as Geophysics 385Y.)  
1-3 units, Spr (Roughgarden)

**EARTH SYSTEMS**

112. Anthrosphere: Human Interactions with Earth and the Environment—(Same as Economics 155.)  
5 units, Spr (Goulder)

**ECONOMICS**

121. The Economics of Greater China and the World  
5 units, Win (Rozelle)

126. Comparative Economic Institutions: The Economics of Transition  
5 units, Spr (Qian)

**FOOD RESEARCH INSTITUTE**

103. The World Food Economy  
5 units, Win (Falcon, Naylor)

118/218. Economic Development in Latin America  
5 units, Win (Reynolds)

5 units (Yotopoulos) given 1998-99

**HUMAN BIOLOGY**

105. Ethnogerontology: Aging and Ethnicity  
4 units (Edmonds, Gallagher-Thompson, Yeo) not given 1997-98

118. Human Diversity: A Linguistic Perspective  
3 units (Ruhlen) not given 1997-98

120. Human Nutrition  
4 units, Aut (Butterfield)
125. Environmental Policy and Law  
5 units, Spr (Rosencranz)

131. Natural Resources Policy and Law  
5 units, Win (Rosencranz)

135. Global Environmental Policy and Law  
5 units, Aut (Rosencranz)

143. Corporate Responsibility in our Local and Global Environment  
4 units, Win (Rosencranz)

145. Sustainable Development in Indigenous Communities: Case Studies  
3 units, Aut (Durham, Zaidenweber)

148. Environmental Policy  
3 units (A. Ehrlich) not given 1997-98

149. Indigenous Peoples and Environmental Problems  
3-5 units, Spr (Staff)

150. Gender-Specific Perspectives on Birth Control  
5 units (Djerassi) not given 1997-98

167. International Health  
3 units, Spr (K. Smith)

LATIN AMERICAN STUDIES

87Q. Stanford Introductory Seminar: Urbanization, Poverty, and Children in Latin America  
5 units, Spr (Morrison)

195. Perspectives on Sustainable Development in Latin America  
5 units, Win (Rosset)

234. Ecology and Biodiversity of Mexico  
5 units, Aut (Sarukhán)

235. Comparative Conservation Strategies in Latin America  
5 units, Spr (Sarukhán)

OVERSEAS STUDIES

106H. Man-Environment Interactions: Case Studies from Central Chile—Santiago.  
5 units, Aut (Hajek)

112X. Environmental Biology of Russia—Moscow.  
5 units, Aut (Yampolsky)

122P. Environmental Policy in Europe—Berlin—(Same as Human Biology 125X, Public Policy 122P.)  
4-5 units, Aut (Jakobeit)  
Spr (Bedarff)

5 units, Win (Hajek)

SCIENCE, TECHNOLOGY, AND SOCIETY

114Q. Stanford Introductory Seminar: Environmental Ethics  
3-4 units, Aut (McGinn)

279. Technology Policy and Management in Newly Industrializing Countries  
2-4 units, Aut (Forbes)

SOCILOGY

134. Education and the Status of Women: Comparative Perspective—(Same as Education 197.)  
4-5 units, Win (Ramirez)

217. China’s Social Transformation  
5 units, Win (Walder)

PSYCHOLOGY

Emeriti: (Professors) Leo Ganz, Albert H. Hastorf, Ernest R. Hilgard, Douglas H. Lawrence, Eleanor E. Maccoby, Roger N. Shepard  
Chair: Claude M. Steele  
Vice-Chair: Laura L. Carstensen  

Associate Professors: Laura L. Carstensen, Anne Fernald  
Assistant Professors: John D. E. Gabrieli, James J. Gross (on leave Winter, Spring), David J. Heeger, Felicia Pratto (on leave)  
Professor (Teaching): Russell D. Fernald  

Courtesy Professors: James Greeno, Richard J. Shavelson, Carl Thoresen  

Affiliated Faculty: Albert Ahumada, Jr., Douglas Daher, Elise Lenox, Alejandro Martinez, Robert Matano, Donald Norman, Carol Pertofsky, Andrew B. Watson  

Senior Lecturer: Lyn Carlsmith  

Lecturers: Douglas Daher, Ronaldo Mendoza  
Director, Bing Nursery School: Jeanne Lepper  

The Department of Psychology, housed in Jordan Hall, maintains shop facilities and extensive laboratories; the latter are equipped with computers and some are linked directly to the University’s computer center. Bing Nursery School, located on campus at 850 Escondido Road, provides a laboratory for child observation, training in nursery school teaching, and research. It was constructed with funding from the National Sci-
The department provides (1) courses designed for the general student, (2) a major program leading to the degree of Bachelor of Arts which includes honors and a specialization in one of four content area tracks, (3) a minor program, (4) a coterminal master's degree program leading to the degree of Master of Arts, and (5) programs of graduate study and research leading to the degree of Doctor of Philosophy. Applications are not accepted for the master’s degree except as noted below.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

Major Requirements—As of Autumn Quarter 1996-97, all students declaring in Psychology must complete a minimum of 55 units of course work in psychology. All courses taken to satisfy the 55-unit requirement must be taken for a grade point average (GPA) of 'C' or better. All majors complete Psychology 1, Introduction to Psychology, and one course in statistics which may be selected from Psychology 10 or 101. Beyond these two required courses, students must choose at least five of the following eight core courses:

20. Introduction to Brain and Behavior
30. Introduction to Perception
40. Introduction to Cognitive Psychology
50. Introduction to Human Neuropsychology
60. Introduction to Developmental Psychology
70. Introduction to Social Psychology
80. Introduction to Personality Psychology
90. Introduction to Abnormal Psychology

The department strongly recommends that all majors take at least one seminar. Ten units of independent study and practica (191, 192, 194, 195) may count toward the major. These courses are graded on a mandatory Satisfactory/No Credit basis. Students enrolled in the senior honors program may take up to 15 units in independent study and practica, including Psychology 197 and 198.

Lifestyle courses such as Psychology 190, 193, 196, and 199 do not count toward the Psychology major.

Transfer students must take at least 28 units of course work in the department in order to receive the department's recommendation for graduation. Such students may receive transfer units for courses completed in psychology at any accredited university or college provided that the courses were taught by a regular faculty member and were approved by the Transfer Credit Office. All students must satisfy the five-core-course requirement through courses completed at Stanford.

Beyond the Minimal Requirement—Many students want a “stronger” program than the minimal requirements listed above. This may be achieved in any or all of these ways:

1. Within the general major, the student may take advanced undergraduate or graduate courses. The student may also take advantage of widespread opportunities for directed research, working closely with individual faculty and graduate students.

2. The student may apply to the senior honors program, described below.

3. The student may elect to pursue one of four specialization tracks: Health and Development, Neurosciences, Decision Sciences, or Cognitive Sciences.

The training obtained from the pursuit of any of these options is valuable not only for students considering graduate work in psychology, but also those thinking of professional careers outside of psychology.

Note—Students who declared the psychology major before Autumn Quarter 1996-97 have the option of completing their major requirements as described in the Stanford Bulletin 1995-96.

MINORS

Declaration—Students may declare a minor field of concentration in Psychology, which must be completed no later than the last day of the quarter two quarters before degree conferral.

Requirements—Completion of a minimum of seven courses in psychology is required for the minor. Beyond Psychology 1 and 10, the minor must include three of eight core courses (20, 30, 40, 50, 60, 70, 80, 90) and at least two other courses within the department. All courses to be counted toward the minor must be passed with GPA of 'C' or better. Courses taken on Credit/No Credit basis do not count toward the minor.

SPECIALIZATION TRACKS

Students in the major program, including those in the honors program, may elect to specialize in one of four tracks, namely, Health and Development, Neurosciences, Decision Sciences, and Cognitive Sciences. Specialization consists of a coherent sequence of courses leading to advanced undergraduate or even graduate-level courses in an area. Typically, the sequence includes two to four required courses and four to six recommended courses in psychology, along with four to seven courses in related disciplines. (These courses would count toward satisfying the major requirements stated above.) In the ideal case, the student who specializes would acquire an understanding of a range of psychological processes, as well as an appreciation of the significance of these processes in the chosen area of application. In this way, specialization could facilitate the student’s preparation for a professional career in, for ex-
ample, medicine, business, or counseling, or for graduate work in psychology and a more academic career.

Two or three faculty members serve as academic advisers for each track. After declaring a major, a student who wants to specialize should discuss the chosen track with an appropriate adviser. Information about the advisers and about the required and recommended courses for each track is available from the student services officer in the department.

For information concerning the coterminal bachelor’s and master’s degree program, see below.

HONORS PROGRAM

The senior honors program is designed for exceptionally able students who wish to pursue a year of intensive supervised independent research. Admission to the program is made at the end of the student’s junior year on the basis of (1) excellent academic performance, (2) previous research experience, and (3) recommendations by faculty and/or graduate students. An information meeting about the program is held in Winter Quarter.

Students interested in the program should involve themselves in research as early as possible and acquire a broad general background in a chosen area. The program is particularly appropriate for students planning to go to graduate school in psychology and in other social sciences, as well as computer science, business, law, and medicine.

Funds for research are available on a competitive basis in the form of Firestone Grants (applied for early in Spring Quarter of the junior year) and Small Grants (applied for early in Autumn Quarter of the senior year). Information is available at the Undergraduate Research Opportunities office in Sweet Hall.

During Autumn Quarter of the senior year, students participate in a weekly seminar concerned with general methods and issues in psychological research. At the same time, they plan for research under the supervision of an appropriate faculty member, and proposals are presented orally at the seminar for discussion. A written copy of the proposal is turned in at the end of Autumn Quarter. During Winter and Spring Quarters, students are primarily involved in completing research and writing the dissertation. Students present completed projects at a convention at the end of Spring Quarter, attended by other students, faculty, and graduate students.

GRADUATE PROGRAMS

There are no specific course requirements for admission to the doctoral program. However, an applicant should have research experience as an undergraduate, as well as the equivalent of an undergraduate major in psychology. The major focus of the doctoral program is on research training, and admission is highly selective.

Applicants for admission must submit their scores on the Graduate Record Examination (both general and psychology subject tests) as part of the application. This examination may be taken at most universities and colleges.

MASTERS OF ARTS

The Department of Psychology normally offers an A.M. degree only to students concurrently enrolled in its Ph.D. program or students concurrently pursuing coterminal A.B. and A.M. degrees. All applicants must satisfy the College's residence requirements for the degree and are responsible for consulting with their primary departments or the Financial Aid Office about the effects of the proposed program on their current funding.

Stanford undergraduate students who would like advanced training in psychology may apply for a coterminal A.M. degree in psychology. To do so, students should consult with the student services officer in the department. Along with a coterminal program application, applicants must submit (1) a statement of purpose, (2) a program plan specifying the courses in which they intend to enroll to fulfill degree requirements, (3) at least two letters of recommendation from Stanford faculty members familiar with their academic work, (4) a current Stanford undergraduate transcript, (5) SAT scores (which may be requested from the Registrar's Office), and (6) a written agreement by a member of the psychology faculty to serve as the student's adviser. This program is limited in size and admissions are highly selective. Students should apply to this program between their eighth and eleventh quarters of undergraduate study. The department's deadline for the submission of an application to the coterminal program is March 1.

In exceptional cases, students concurrently enrolled in another doctoral or professional program at Stanford may also apply for the A.M. degree. Such applicants should also consult with the department's student services officer, and need to submit (1) a statement of purpose, (2) a program plan specifying the courses in which they intend to enroll to fulfill degree requirements, (3) at least two letters of recommendation from Stanford faculty members familiar with their academic work, (4) complete undergraduate transcript(s), (5) a current Stanford transcript, (6) GRE (or professional school test) scores, and (7) a written agreement by a member of the psychology faculty to serve as the student's adviser.

Students must complete at least 36 units of psychology courses for the degree. (For coterminal degree students, course work for the master's degree may not duplicate courses taken for the undergraduate degree.) Of these 36 units, at least
The Ph.D., normally taking no more than 9 units of course work each quarter. At the end of the first year of graduate study, the student must take 207 (Pro-Seminar for First-Year Graduate Students), at least one approved graduate statistics course, and at least one core course selected from the core group and in a second approved graduate course in statistics. Of the five core courses selected during the first and second years of graduate study, at least two must be selected from Group A and at least two from Group B. The student may meet these requirements either by taking the courses listed above, or by special examination. Further course work prior to admission to doctoral candidacy should be arranged under guidance of the student's adviser.

DOCTOR OF PHILOSOPHY

In addition to fulfilling the residence requirement for the degree, the following requirements are stipulated.

First-Year Course Requirements—During the first year of graduate study, the student must take 207 (Pro-Seminar for First-Year Graduate Students), at least one approved graduate statistics course, and at least one core course selected from Group A and one core course selected from Group B (listed below).

Group A:

200. Foundations of Cognitive Science
203. Perception
206. Behavioral Neuroscience
210. Human Memory and Learning
214. Psycholinguistics

Group B:

211. Advanced Developmental Psychology
212. Social Psychology
213. Personality
215. Abnormal Psychology
216. Mind, Culture, and Society
259. Emotions

The student is expected to spend at least half of the time in research from the beginning of the first year of graduate study to the completion of the Ph.D., normally taking no more than 9 units of course work each quarter. At the end of the first year of graduate study, the student must file with the department a written report of the first-year research activities.

Second-Year Course Requirements—During the second year of graduate study (or as additional courses during the first year), the student must show competence in three additional areas selected from the core group and in a second approved graduate course in statistics. Of the five core courses selected during the first and second years of graduate study, at least two must be selected from Group A and at least two from Group B. The student may meet these requirements either by taking the courses listed above, or by special examination. Further course work prior to admission to doctoral candidacy should be arranged under guidance of the student's adviser.

Third-Year Major Area Paper—During the first week of Autumn Quarter of the fourth year, the student turns in a Conceptual Analysis of the Dissertation Area (CADA). This paper provides a general framework for the research topic of the dissertation, addresses the central issues within the specialty area, and reviews the pertinent literature(s). Typically, the analysis has the kind of scope found in the opening chapters of the more traditional dissertations, but the exact format and scope of the paper is a joint decision made by student and adviser.

At this same time, the student selects two faculty members to read the paper and give feedback and commentary on it. These should be two faculty members most likely to serve on the later orals committee of the dissertation.

A portion of the paper, revised as appropriate, can then become the first section of the actual dissertation proposal. Thus, the student receives additional feedback on CADA at the oral examination itself.

If the student should radically change the area of the dissertation research after CADA has been written, the formal CADA procedure does not need to be repeated for the second dissertation topic. The student is still expected to be knowledgeable about the literature and problems of any research topics being pursued for the dissertation.

Minor Requirements—The candidate must complete either a University minor satisfactory to the minor department, or elect to have the minor waived by selecting 12 approved units outside the department. A student designing a program of 12 units outside the Department of Psychology is expected to do so in consultation with the adviser.

Dissertation Reading Committee—The candidate must select a dissertation reading committee satisfactory to the department. The minimum membership of this committee must be (1) the principal dissertation adviser, (2) a second member
from within the department, and (3) a third member chosen from Psychology or another department.

Orals—The candidate must pass the University oral examination, which is based on the dissertation proposal, not on the defense of the dissertation itself. The reason for this policy is to permit the oral to serve the function of guiding and improving the proposed research. This function can best be served if the oral is scheduled early in the year in which the dissertation research is conducted. It is therefore expected that the oral will be taken by the end of the Autumn Quarter of the fourth year.

Dissertation Requirements—The candidate must complete a dissertation satisfactory to the dissertation reading committee.

Ph.D. candidacy expires five years after admission to candidacy by the University Committee on Graduate Studies. Reapplication requires department reexamination.

STUDENT EVALUATIONS

First-Year Evaluation—It is the department's policy to evaluate the progress of each graduate student at the end of the first year of graduate study. As part of the procedure, each student is required to file with the department a report of the first-year research activities.

Students should discuss this report and the evaluation procedures with their adviser as early as possible in their first year. The report is due on June 1.

If the student fulfills the academic promise displayed upon entrance, he or she is invited to continue to the doctorate.

The first-year evaluation is primarily based on three factors:
1. The quality of research carried out in the first year
2. Performances in courses (especially required courses)
3. Recommendations of the adviser (including a commitment on the part of that adviser to continue in that role)

Second-Year Evaluation—A similar evaluation is conducted at the end of the second year of graduate training involving the same criteria as the first year; however, the student is not required to submit a paper. Students who do not make satisfactory progress during the second year may be dropped from the program.

THE DOCTORAL TRAINING PROGRAM

As indicated by the requirements described above, a student may concentrate in any one of several areas within psychology. Regardless of area, however, the training program places emphasis on the development of research competence, and students are encouraged to develop those skills and attitudes that are appropriate to a career of continuing research productivity.

Two kinds of experience are necessary for this purpose. One is the learning of substantial amounts of technical information. A number of courses and seminars are provided to assist in this learning, and a student is expected to work out a program, with his or her adviser, that attains such knowledge in the most stimulating and economical fashion.

A second aspect of training is one that cannot be gained from the courses or seminars. This is firsthand knowledge of, and practical experience with, the methods of psychological investigation and study. These methods do not exist in the abstract; they are ways of behaving with the people or animals who are being studied. They are skills and require guided practice for their perfection. Students are provided with whatever opportunities they need to reach those levels of competence representative of doctoral standing. Continuing research programs, sponsored by members of the faculty, offer direct opportunities for experience in fields represented by the faculty's many research interests.

Each student achieves competence in unique ways and rates. Each student and adviser share in planning a program leading to the objectives discussed. The student is expected to spend half of his or her time on research and normally takes no more than 9 units of course work per quarter.

FELLOWSHIPS, SCHOLARSHIPS, AND ASSISTANTSHIPS

Research and teaching assistantships, United States Public Health Service traineeships, and some University fellowships are available. The type of support offered may vary from year to year. The department depends on the fact that a number of its students receive outside awards. Qualified applicants are asked to take initiative in applying for predoctoral fellowships from the National Science Foundation, the Danforth Foundation, Ford Foundation, and the United States Public Health Service, among others. Applications may be made by college seniors planning to work for a higher degree. Students should apply early in Autumn Quarter of the senior year. For information concerning application forms and procedures, consult representatives from the financial awards office of your home institution.

TEACHING REQUIREMENT

The department views experience in supervised teaching as an integral part of its graduate program. Regardless of the source of financial support, all students serve as teaching assistants for four Psychology courses during their graduate study. Of the four courses, one of them should be Psychology 1, General Psychology, and another should be Psychology 10, Statistical Methods. Students
are discouraged from participating in teaching the first year of graduate study. Students typically progress from closely supervised teaching to more independent work. They usually begin by teaching sections of General Psychology and Statistics and then progress to more advanced courses in their area of specialization. They may offer a supervised, but essentially independent, seminar during their final year of graduate study.

Ph.D. MINOR
Candidates for the Ph.D. degree in other departments may elect a minor in psychology. To obtain a minor, the student must complete 20 units of course work at the graduate level in the Department of Psychology, excluding Psychology 275 (graduate-level research). Cross-listed graduate courses can be used to satisfy this requirement.

COGNITIVE SCIENCE PROGRAM
Psychology is participating, along with the departments of Computer Science, Linguistics, Philosophy, and the School of Education, in an interdisciplinary program of cognitive science. The program is intended to provide students with an interdisciplinary education as well as a deeper concentration in psychology. Doctoral students are eligible to participate in the Cognitive Science Program. Students who complete the requirements receive a special designation in cognitive science along with the Ph.D. in Psychology. To receive this field designation, students must complete 30 units of approved courses, 18 of which must be taken in two disciplines outside of psychology.

PSYCHOLOGY COLLOQUIUM
The Psychology Colloquium meets on most Wednesday afternoons at 3:45. Topics of current interest are presented by speakers from Stanford and other institutions. Graduate students are expected to attend.

COURSES
(WIM) indicates that the course meets the Writing in the Major requirements.

SUMMER SESSION
The courses announced for the Summer Session are those regularly scheduled in the department curriculum. Additional courses may be announced in the Stanford University bulletin Summer Session Catalogue, issued annually in January.

STANFORD INTRODUCTORY SEMINARS
4N. Stanford Introductory Seminar: Affect and Cognition—Preference to freshmen. The psychological processes of emotions as they influence behavior, emphasizing the relation of emotions to other psychological concepts, such as cognition and motivation. Conscious and nonconscious emotional influences. Three credits for paper and final exam; two credits for final exam only.
3 units, Win (Zajonc)

7N. Stanford Introductory Seminar: Consciousness—Preference to freshmen. Readings in Francis Crick's The Astonishing Hypothesis: The Scientific Search for the Soul about consciousness, specifically visual awareness, augmented by original research articles. Emphasis is on developing the ability to evaluate scientific research, plus discussions about scientific method and science writing. Short papers and in-class presentations. GER:3b (DR:9)
3 units, Spr (Heeger, Wandell)

11Q. Stanford Introductory Seminar: Social Psychology and Social Policy—Preference to sophomores. Introduction to theory and research on contemporary social problems in psychology (racial and ethnic strife, environmental degradation, poverty, educational underachievement, homelessness, crime) and related questions of social policy. The rationale for, and wisdom of "intervention" programs ("headstart," affirmative action, economic or legislative remedies) in light of the lessons provided by social psychology and its subdisciplines (judgment and decision making, negotiation, and dispute resolution). Emphasis is on processes and biases relevant to self-perceptions and interpersonal and intergroup perceptions. The nature of "wise" social interventions and the role and limitations of empirical research in addressing contentious social issues.
3 units (Ross) not given 1997-98

12Q. Stanford Introductory Dialogue: Emotion—Preference to sophomores. Considers fundamental questions about emotions: What is emotion? Why do we have emotions? Can we change our emotions? How do different people's emotions differ? Can emotions make us sick? Focus is on experimentally tractable questions, and empirical research findings relevant to these questions, emphasizing critical thinking and writing skills. Limited enrollment.
2 units, Aut (Gross)

13Q. Stanford Introductory Dialogue: The Two Sexes—Preference to sophomores. In childhood, children associate mainly with others of their own sex. The reasons why this happens, and the implications of this childhood history for the way men and women relate to each other in adulthood.
2 units, Aut (Maccoby)

14Q. Stanford Introductory Dialogue: Psychological Studies of the Life Course—Preference to sophomores. How psychologists have conceived of the life course of an individual from birth to death, exploring two or three classical life course studies, including Lewis Terman's study of the gifted.
2 units, Win (Hastorf)
by behavioral interactions. Behavior is described in
the brain regulates behavior and in turn is influenced
20. Introduction to Brain and Behavior—How

OPEN TO ALL STUDENTS

Additional courses not listed here are frequently offered competence by selected postdoctoral or terminal Ph.D. personnel in the areas of their special research. These are listed in the quarterly Time Schedule; the course descriptions are circulated in advance.

1. Introduction to Psychology—The scientific study of behavior, focusing on psychological research and theory. Topics: the biological bases of behavior, sensation and perception, emotion, learning, memory, cognition, child development, psychopathology, and social psychology. Prerequisite: 111 or Human Biology core. GER:3b (DR:9)

3 units, Aut (R. Fernald)

2. Current Research in Psychology—Weekly seminars by faculty members on current research topics in psychology. Prerequisites: prior or concurrent enrollment in 1, declared psychology major.

1 unit, Aut, Win, Spr (Staff)

3. Practicum in Effective Teaching Methods and Style—Enrollment limited to advanced undergraduates serving as teaching assistants in Psychology 1. Discussions on teaching methods and style, selected readings on teaching effectiveness, student presentations to class sections, preparation of exams, and grading essays and term papers.

2 units, Spr (Zimbardo)

10. Introduction to Statistical Methods—(Same as Statistics 60.) A nonmathematical study of statistical methods. Emphasis is on statistical techniques. Organization of data, averages, variability, and association. Statistical inference, tests of hypotheses, estimation, and confidence intervals. Computer statistical packages are used. GER:2c (DR:4)

5 units, Aut (Walther)

Win (Sen)

Spr (Thomas)

20. Introduction to Brain and Behavior—How the brain regulates behavior and in turn is influenced by behavioral interactions. Behavior is described in

physiological terms, organized with respect to evolutionary principles. Topics: neurons, transmission of neural information, anatomy and physiology of sensory and motor systems, regulation of body states and the biology of learning, memory, and psychopathology. GER:2a (DR:5)

3 units, Aut (R. Fernald)

30. Introduction to Perception—Perceptual psychology and sensory neuroscience, emphasizing vision and hearing. Topics: anatomy and physiology of the eye and ear, anatomy and physiology of the visual and auditory areas of the brain, pitch and loudness perception, speech perception, color vision, depth perception, visual motion perception, etc. GER:3b (DR:9)

3 units, Spr (Heeger)

40. Introduction to Cognitive Psychology—Survey and analysis of major topics in cognitive psychology, including perception, memory, problem solving, and reasoning. Emphasis is on contemporary research and theory. Prerequisites: 1 and 101, or consent of instructor. GER:3b (DR:9)

4 units, Win (B. Tversky)

50. Introduction to Human Neuropsychology—Topics in human neuropsychology. Review of the functional organization of the human nervous system and of brain imaging techniques (MRI, PET, etc.). Hemispheric specialization and the brain basis of perception, memory, language, emotion, spatial cognition, and problem solving. Neuropsychological deficits in neurological disorders and their implications in understanding normal function. Prerequisite: 1 or equivalent. (WIM)

4 units, Win (Gabrieli)

60. Introduction to Developmental Psychology—Psychological development from birth to adulthood, emphasizing infancy and the early and middle childhood years. The nature of change during childhood and theories of development. Prerequisite: 1 or equivalent. GER:3b (DR:9) (WIM)

3 units, Aut (Flavell)

60A. Introduction to Developmental Psychology Section—Guided observation of children age 2-6 at Bing Nursery School. Corequisite: 60.

2 units, Aut (Hartman)

70. Introduction to Social Psychology—Surveys and empirical research on social psychological topics: attitudes and persuasion, identity, person perception, compliance, obedience, group think, aggression, altruism, love, and other interpersonal relationships, prejudice, stereotyping, roles, norms, attribution, and social judgment. Two lectures plus section each week. Original research. Prerequisite: 1 or equivalent. GER:3b (DR:9) (WIM)

4 units, Win (Cohen, Mendoza)

80. Introduction to Personality Psychology—The study of personality. Key concepts and research
methods; major theoretical approaches and related empirical findings including psychodynamic, trait, biological, humanistic, behavioral, social-learning, and cognitive perspectives. Focuses on the role of emotion. Prerequisite: 1 or equivalent. GER:3b (DR:9) (WIM)

3 units, Spr (Gotlib)

80A. Introduction to Personality Psychology Section—Corequisite: enrollment in 80.
1 unit, Spr (Gotlib)

90. Introduction to Abnormal Psychology—The nature, origin, and treatment of a variety of psychological disturbances, examined from psychodynamic, behavioral, cognitive, and biomedical perspectives. Historical and current controversies in the field. Prerequisite: 1 or equivalent. GER:3b (DR:9)
3 units, Win (Butler)

101. Introduction to Statistical Methods (Postcalculus) for Social Scientists—(Enroll in Economics 80, Statistics 190.)
3-5 units, Aut (Switzer, Bloch)
Win (Ryu)
Spr (Donaldson)

102. Statistical Methods for Behavioral and Social Sciences—For undergraduates; see 252.

103. Statistical Theory, Models, and Methodology—For undergraduates; see 253.

110. Research Methods and Experimental Design—Experimental research methods and principles in psychology. Structured research exercises and the design of an individual research project. Prerequisite: consent of instructor.
5 units, Spr (M. Lepper)

111. Research Methods in Developmental Psychology—For students interested in research skills. Focus is on conceptual and methodological issues related to research on early development; training in experimental design, lab and observational procedures; and the collection, analysis, and interpretation of data. Students conduct a series of supervised experiments, with infants and preschoolers, at the Center for Infant Studies in the Department of Psychology at the Bing School. Limited enrollment. Prerequisites: 60 or 140 or Human Biology 3B, and consent of instructors.
4 units (A. Fernald, Flavell, Markman) not given 1997-98

111A. Research Methods in Developmental Psychology Section—Corerequisite: 111.
2 units (A. Fernald, Flavell, Markman) not given 1997-98

112. Research Methods in Cognitive Psychology—Examination of experimental research methods and principles in cognitive psychology, with some application to neuroscience. Structured research exercises are required. Prerequisite: consent of instructor.
5 units (Gabrieli) alternate years, given 1998-99

120. Cellular Neuroscience: Cell Signaling and Behavior—Survey of neural interactions underlying behavior. Prerequisites: 1 or equivalent, and elementary biology.
4 units, Aut (Wine)

121. Ion Transport and Intracellular Messengers—(Graduate students register for 228.) Ion channels, carriers, ion pumps, and their regulation by intracellular messengers in a variety of cell types. Lab demonstrations and brief hands-on introduction to some techniques (e.g., patch clamping). Recommended: 120 or introductory course in biology or human biology.
3 units, Spr (Wine)

122. Human Behavioral Biology—(Enroll in Biology 150.)
5 units, Spr (Sapolsky) alternate years, not given 1998-99

123. Seminar on Topics in Perception—Current research topics in perceptual psychology, neurophysiology of perception, computational models, and computer vision. Topics: color vision, visual motion perception, binocular vision, shape perception, visual search, psychoacoustics, attention, eye movements. Prerequisites: 30, consent of the instructor.
1-2 units (Heeger) not given 1997-98

124. Seminar on Psychophysiology—See 236.
Prerequisite: consent of instructor.
4 units (Gross) not given 1997-98

125. Senior Seminar in Neuroscience—Enrollment is limited to, and required of, seniors completing the neuroscience track in psychology. Current findings and ideas in neuroscience research.
2 units (Gabrieli) not given 1997-98

126. Sleep and Dreams—(Enroll in Human Biology 11.)
3 units, Win (Dement)

128. Seminar in Auditory Perception—Fundamental and advanced concepts in the psychology of hearing, with an emphasis on key experimental findings. Auditory physiology, grouping principles, scene analysis, streaming, auditory memory and imagery, music perception and cognition, the auditory world of animals, loudness and pitch, speech perception, and categorical perception. Prerequisite: 20, 30 or 40. Recommended: 110.
3 units, Spr (Levitin)

130. Development in Infancy—Development in the first two years of life. Topics: prenatal development, perceptual development, cognitive development in infancy, infant social cognition, social and emotional development, parent-infant interaction,
and preverbal communication. Prerequisite: 1, 111 or Human Biology core.
3 units, Spr (Mumme)

131. Language and Thought—The psychology of language, including production and understanding in utterances; from speech sounds to speaker’s meaning; children’s acquisition of the first language; and psychological bases for language systems. Language functions in natural contexts and their relation to the processes by which language is produced, understood, and acquired. Prerequisite: 1 or Linguistics 1.
4 units, Aut (Arnold)

133. Human Abilities—(Same as Education 255.) Introductory survey of psychological theory and research on human cognitive abilities; their nature, development, and measurement; and their importance in society. Relation of education and intellectual abilities. Cognitive analysis of verbal reasoning and spatial abilities. Individual differences in relation to motivation, personality, gender, and ethnic differences. Prerequisite: 1 or equivalent.
3 units, Win (Snow)

134. Seminar on Language and Deception—Deceptive, exploitative, and other noncooperative uses of language. How is language used to deceive or exploit? Where are these techniques practiced and why? What are the personal, ethical, and social consequences of these practices? Prerequisite: 131, Linguistics 1, or Philosophy 181.
3 units (H. Clark) not given 1997-98

140. Culture and Human Development—Child development and child rearing in diverse cultures, integrating perspectives and research from developmental psychology, anthropology, and population studies. Emphasis is on Japan, Kenya, India, and the U.S., examining how cultural traditions and social practices shape the environments of infancy and childhood, and influence human cognitions, emotions, moral judgments, and social behavior across the lifespan. Prerequisite: 60 or Human Biology 3B.
4 units (A. Fernald) not given 1997-98

141. Cognitive Development—Topics and issues on cognitive development, developmental changes in memory, conceptual organization, logical reasoning, and communication skills. Prerequisite: 1. GER:3b (DR:9)
3-4 units, Aut (Markman)

142. Social Development—Socialization and the development of social behaviors. Review of research concerning conscience and conduct, altruism and aggression, cooperation and competition, achievement, motivation, and self-control.
3-4 units, Win (M. Lepper)

143. Seminar on Development of Children’s Knowledge about the Mind—(Graduate students register for 294.) Prerequisite: consent of instructor.
3 units (Flavell)

144. Conceptual Organization and Development—See 242. Prerequisite: 141 or consent of instructor.
alternate years, given 1998-99

145. Research Seminar on Infancy—For students involved in research on infant development. Prerequisite: 111.
1-3 unit, Aut, Win, Spr (A. Fernald)

146. Observation of Children—Seminar on learning about children through guided observations at Bing Nursery School, Psychology’s lab for research and training in child development. Physical, emotional, social, cognitive, and language development. Recommended: 60.
3-5 units, Win, Spr (J. Lepper)

147. Development in Early Childhood—Supervised experience with young children at Bing Nursery School. Three units require 4 hours per week in Bing classrooms throughout the quarter; 4 units require 7 hours per week; 5 units require 10.5 hours per week. Weekly seminar on developmental issues in the teaching-learning environment at Bing School. Prerequisite: 60 or 146, or consent of instructor.
3-5 units, Aut (J. Lepper)
Win (Hartman)
Spr (Farish)

148. Seminar on Child Development in Cultural Context—Focuses on the social and cognitive development of children in diverse cultures. Debates about the influence of our own cultural framework on the methods used in psychological research, and on the views of human nature implicit in major developmental theories. Limited enrollment. Prerequisite: 60, 141, 142, or Human Biology 3B.
3 units (A. Fernald) not given 1997-98

149. Real World Applications of Developmental Psychology—Applications of developmental theories to the design and evaluation of formal and informal educational environments for infants to adolescents, e.g., toys, games, software, children’s television and museums, and school. Emphasis is on cognitive development; may address perceptual, social, and moral development. Prerequisite: 40 or 60.
3 units, Spr (Fay)

152. Social Conflict: Models and Methods of Mediation—Conceptual models of social conflict and approaches to resolving them. Examples from a spectrum of conflict settings from minor disputes between individuals to intragroup and intergroup tensions. Existing theories and empirical research. Students generate examples from the Stanford community, using that material to learn the skills and methods of mediation in resolving social conflict.
3 unit, Spr (Horowitz)
153. Introduction to Clinical Psychology—Survey and analysis of topics in clinical psychology: the history of clinical psychology, models and assessment of personality, behavior, cognition, psychopathology, and approaches to the treatment of abnormal behavior. Emphasis is on current theory, research, and issues in clinical psychology and on the role of clinical psychology in contemporary society. Prerequisite: 1 or equivalent.
3 units, Win (Gotlib)

154. Selected Topics in Affective Disorders—See 234.
3 units, Spr (Gotlib)

156. Applications of Social Psychology—(Graduate students register for 271.) The application of social psychological theory and research to a variety of issues and problems: evaluating the impact of social interventions, strategies, and shortcomings in personal and social decision making, effects of mass media and other sources of social persuasion, problems of conflict resolution and negotiation, applications of social psychology in legal, medical, educational, and business settings. Prerequisites: 1 and 10, or consent of instructor.
4 units, Win (Ross)

157. Theoretical Approaches in Social Psychology—(Graduate students register for 279.) The field of social psychology, organized by the theories and systems that tie together wide-ranging findings and phenomena. Possible topics: how attitudes, beliefs, and self-concepts originate in our actions; the importance of construal and cognition in social-psychological phenomena; and the relationships between thought, emotion, and health. Emphasis is on developing a systematic understanding of the field of social psychology.
3 units (Steele) alternate years, given 1998-99

158. Emotions: History, Theories, and Research—See 259. Prerequisite: consent of instructor.
3 units, Spr (Zajonc)

3 units (Steele) not given 1997-98

160. Culture and Self—See 226. Prerequisites: 1, 10, 70.
3 units, Win (Markus)

161. Cultural Psychology—The cultural sources of diversity in thinking, emotion, motivation, self, personality, morality, development, and psychopathology. Prerequisite: 1 or equivalent.
4 units, Spr (Markus)

162. Psychology of Gender—Research and theory on the socialization and psychological development of women and men. The biological, cultural, and social factors that influence gendered behavior. GER:3b,4c (DR:91)
3 units (Carstensen) not given 1997-98

163. The Interpersonal Basis of Abnormal Behavior—The role of interpersonal problems and processes in producing different forms of psychopathology, from neurotic reactions to schizophrenia. Combines clinical (case study) approach with conventional empirical approaches to clarify the origin, nature, and treatment of emotional disorders. Prerequisite: 90.
3 units, Spr (Horowitz)

165. Peace Studies—(Same as Education 173X, History 154, Political Science 133.) Interdisciplinary, dealing with the challenges of pursuing peace in a world where the sources of conflict are many and regional, ethnic, and religious hostilities are rising. The art of creating and maintaining peace is analyzed from historical, social, psychological, and moral perspectives. Goals: illustrate the current and potential contributions of various academic disciplines and critical analyses to the study of peace; and to prepare students to think critically and to act responsibly and effectively on behalf of peace. Eight sections: challenges, enemies, theoretical understandings, justice, security, non-violence, public peace processes, peace and you.
5 units, Spr (Bernstein, Bland, Noddings Ross, Stedman)

166. Seminar on Personal and Social Change—Analysis of social cognitive approaches to personal and social change. Applications of sociocognitive theory to the modification of psychological dysfunctions in familial, educational, medical, and organizational settings. Ethical and value issues in behavior change.
3 units, Spr (Bandura)

167. Seminar on Aggression—Analysis of the causes and modification of individual and collective aggression. Major issues in aggression: social labeling of injurious conduct, social determinants of aggression, effects of the mass media, institutional sanctions and deterrence doctrines. 3 units, Win (Bandura)

3 units, Aut (Gross)

170. Seminar on the Psychology of Gender—(Graduate students register for 238.) In-depth cov-
171. Research Seminar on Aging—Two-quarter practicum exposes students to multiple phases of research by participating in a laboratory focusing on social behavior in adulthood and old age. Review of current research and participation in ongoing data collection, analysis, and interpretation. Prerequisites: 1, research experience, and consent of instructor.

4 units, Aut, Win, Spr (Carstensen)

174. African American Psychology—Introduction to ethnic psychology, specifically, the psychological dimensions of the Black experience in America. Lectures and readings. Black psychology from its evolution as a concentration area in the social sciences to present concerns that impact Black Americans' mental health. Students are encouraged to expand on the methodological constructs employed in the study of Black Americans.

3 units, Spr (McCants)

175. Seminar on Topics in Identity Development—Issues affecting identity development from adolescence throughout adulthood. Lectures/discussion. Topics: the effect of group dynamics on identity; the impact of social factors such as racism, stereotypes, and culture; how a person's identity affects education and self-esteem.

3 units, Win (McCants)

176. Carl Jung and Analytical Psychology—Introduction to the person of Jung, his seminal philosophical perspectives and their impact on modern thought and life. The formation of analytical psychology with regards to Jung's past relationship with Freud and later emergence as a prominent 20th-century thinker. Emphasis is on the archetypal themes of the shadow, animas/animus (feminine/masculine) and puer/senex (youth/elder). The function of dreams and the interplay between the Jungian paradigm and spirituality.

4 units, Aut (Daher)

177. Asian American Psychology—Current research and literature on the cultural, social, and political influences which shape the psychological issues among Asian Americans. Topics: racism and discrimination, cultural/value conflicts, the immigrant's experience, gender roles, sexuality, person-ality patterns, and the impact of non-Asian American's perceptions of Asians.

3 units, Aut (Daher)

181. Seminar on Lesbian and Gay Perspectives on Psychology—Historical review of theories of sexuality, including the "invention" of sexuality in the West and the diagnosis and control of same-sex desire in psychoanalysis and American psychiatry. Heterosexuality in social psychology's and sexology's theories of sexual attraction and behavior.

Contemporary "lesbian and gay psychology" and its relationships with feminist, cultural, and social-constructivist psychology. Interactions between psychological accounts of sexuality, social identities, and lived experiences.

5 units, Win (Holman)

189. The Psychology of Health and Illness: A Stress and Coping Approach—A contextual or ecological approach to evaluating the role of cognitive, social, and emotional processes in maintaining health, and in coping with stress, trauma, and illness. Vulnerability and resilience to the damaging effects of stress on mental and physical health. Limited enrollment. Prerequisites: 10 or equivalent; 70, 80, or 90

3 units, Win (Holman)

190. Health Psychology and the Campus Culture—Contemporary campus health issues from the perspectives of behavioral, developmental, and social psychology, and the public health model. The prevalence of health-compromising behaviors on the contemporary college campus and the challenges of risk reduction from psychosocial and health psychology paradigms. Students apply theoretical frameworks to peer health psychology projects. Limited enrollment and by consent of instructor following first meeting. Sections in peer health psychology education required.

4 units, Aut, Spr (Martinez, Pertofsky)

191A, B, C. Paraprofessional Internship Program—Primarily for students interested in counseling, clinical, educational, and community psychology through field experience. Opportunities for working with emotionally and behaviorally disturbed children; with adolescents in high school peer-counseling programs or through Juvenile Probation; with adults at the V.A. hospitals, mental health clinics, or centers for the elderly. On-site training and supervision. Internships demand a commitment of time and energy of 8-12 hours per week for two consecutive quarters. Weekly seminar explores the diversity of clinical opportunities and specific therapeutic techniques.

1-5 units (Carlsmith) not given 1997-98

192A, B, C. Experience-Based Study on the Meaning of Being Disabled—Comprehensive look at a number of disabilities; the life experience of the individual affected and his or her family. The roles of doctor, therapist, special education teacher, counselor, and other professionals involved in the life of the disabled person. Weekly seminars; students also teach swimming and/or other skills to children and adults with different disabilities (mental, physical, emotional, learning, etc.) for at least 3 hours weekly, keep an ongoing journal, and participate in a final group or individual action project.

3 units, Aut, Win, Spr (Carlsmith, Wright)
193. Peer Counseling: Issues in Sexual Health and Contraception—Information on methods of contraception, sexually transmitted diseases, and related issues about sexual health are presented by students and experienced health professionals. Discussion, role play, and peer education outreach projects focus on how cultural diversity, communication skills, and community resources influence personal choice and contraceptive behaviors. Required for Sexual Health Peer Resource Center (SHPRC) peer educators. Recommended: courses in human sexuality and peer education.

2 units, Aut, Win, Spr (Anderson)

194. Reading and Special Work—Independent study. Can be repeated for credit. Prerequisite: consent of instructor.

1-3 units, any quarter (Staff)

195. Special Laboratory Projects—Independent study. Can be repeated for credit. Prerequisites: 1, 101, and consent of instructor.

1-6 units, any quarter (Staff)

196. American Drinking and Drug Culture—The role of alcohol and other drugs in American society and in the university community. Social, political, and physiological factors which influence drinking and drug-taking practices.

3 units, Spr (Lenox)

197. Advanced Research—Limited to students in senior honors program. Weekly research seminar, independent research project under the supervision of an appropriate faculty member. A detailed proposal is submitted at the end of Autumn Quarter. Research continues during Winter and Spring Quarters as Senior Honors Research. A progress report demonstrating sufficient progress is required at the end of Winter Quarter.

1-4 units, Aut (B. Tversky)

198. Senior Honors Research—Limited to students in the senior honors program. Work includes finishing the research and data analysis, written dissertation, and presentation at the Senior Honors Convention.

1-4 units, Win, Spr (B. Tversky)

199. Psychological Aspects of Addiction—The medical, psychological, and social issues involved with alcohol and drug abuse and dependence. Students are presented with the etiological theories and psychological perspectives on addiction. Limited enrollment.

3 units, Spr (Matano)

PRIMARILY FOR GRADUATE STUDENTS

Undergraduate students admitted only by consent of instructor.


1-3 units, Win (Rumelhart)

201. Cognitive Neuropsychology—Survey of major topics in human cognitive neuropsychology. Current research about the brain basis of attention, memory, language, perception, spatial cognition, and problem solving. Implications for theories of normal cognition. Prerequisite: 126 or consent of instructor.

1-3 units (Gabrieli)

alternate years, given 1998-99

203. Foundations of Vision—The quantitative and physiological aspects of human vision. Image formation by the eye, retinal sampling and wavelength encoding, neural encoding within the retina and cortex; performance measures including spatial contrast sensitivity, localization, color sensitivity, multiresolution representations of image data; color, motion, and depth perception.

1-3 units (Wandell)

alternate years, given 1998-99

206. Behavioral Neuroscience—The biological substrates of behavior, emphasizing topics currently being investigated by resident and visiting neuroscientists at Stanford. Possible topics: neuroanatomical and neurophysiological aspects of vision; audition; motor control, learning, and memory; and hormonal and neurochemical aspects of stress and motivation.

1-3 units (Wandell, Wine)

alternate years, given 1998-99

207. Proseminar for First-Year Graduate Students—Required of and limited to first-year graduate students in psychology. Survey of major issues in contemporary psychology with their historical backgrounds.

2-3 units, Aut (Steele)

210. Memory and Learning—Major topics in human memory, emphasizing information-processing approaches to short-term memory, organization and long-term memory, forgetting, retrieval processes, prose memory, imagery, emotional memory, autobiographical memory, and skills. Prerequisite: graduate standing in psychology or consent of instructor.

1-3 units, Aut (Bower)

211. Developmental Psychology—Prerequisite: graduate standing in psychology or consent of instructor.

1-3 units, Win (A. Fernald, Flavell)

212. Social Psychology—Prerequisite: 70 or graduate standing in Psychology.

1-3 units, Aut (M. Lepper, Ross)
213. **Personality**—Survey of theory and research in personality. Prerequisite: graduate standing in psychology.
1-3 units, Spr (Cartensen)
alternate years, not given 1998-99

214. **Psycholinguistics**—Prerequisite: graduate standing in Psychology or consent of instructor.
1-3 units (H. Clark) not given 1997-98

215. **Mind, Culture, and Society**—Social psychology from the context of society and culture. Focus: interdependence of psychological and sociocultural processes; how sociocultural factors shape psychological processes; how psychological systems shape sociocultural systems. Conceptualizations of the interdependence of psychological processes and sociocultural context. Use of theoretical developments to understand social issues, problems, and policy. Works of Baldwin, Mead, Asch, Lewin, Burner, and contemporary theory and empirical work on the interdependence of psychology and social context as constituted by gender, ethnicity, race, religion, region of the country, and part of the world.
1-3 units, Win (Markus, Steele)

216. **Abnormal Psychology**—Literature in abnormal psychology is approached from a cognitive and interpersonal perspective. Attempts to integrate psychoanalytic, cognitive, and behavioral views of the nature, origin, and treatment of abnormal behavior. Prerequisite: graduate standing in psychology.
1-3 units, Win (Horowitz)

219. **Graduate Seminar on Selected Topics in Cognition**—Prerequisite: consent of instructor.
1-3 units, Aut (B. Tversky)

220. **Graduate Seminar: Special Topics in Cognitive Development**—Prerequisite: graduate standing in psychology or consent of instructor.
1-3 units (Markman)
alternate years, given 1998-99

221. **Applied Vision and Image Systems**—Lectures/demonstrations illustrate the design and control of color imaging devices (display, printers, cameras, and scanners). The aspects of human vision relevant to software and hardware design. Topics: digital halftoning, color calibration, color metrics, flicker sensitivity, motion compensation, human spatial resolution, visual masking, JPEG principles, printer design, scanner design, color software architecture.
1-3 units, Win (Wandell)

223. **Psychological Perspectives on the Self**—See 159.
1-3 units (Steele) not given 1997-98

226. **Culture and Self**—(Undergraduates register for 160.) Recent perspectives on the nature and functioning of self; anthropological and psychological literature on Japanese, Chinese, Korean, Indian, African, and Arab selves; and the consequences of variation in selfhood for cognition, learning, emotion, motivation, and psychopathology.
1-3 units, Win (Markus)
alternate years, not given 1998-99

227. **Graduate Seminar: Psychobiology**—Behavior in the biological context of a particular species. Behavioral patterns at each level of analysis from the molecular through societal. Discussion of original research papers on questions about the physiological bases of behavior. The rationale and experiments which underlie current concepts about how the brain controls behavior.
1-3 units (R. Fernald)
alternate years, given 1998-99

228. **Ion Transport and Intracellular Messengers**—See 121.
1-3 units, Spr (Wine)

229. **Psychological Assessment**—(Same as Education 237.) Administration and interpretation of commonly used measures of interest, aptitude, achievement, intelligence, and personality for purposes of individual diagnosis and treatment.
1-3 units, not given 1997-98

231. **Graduate Seminar: Self-Efficacy**—Origins, mediating mechanisms, and diverse effects of people's beliefs in their efficacy to exercise control over events in their lives. Alternative theories of perceived control; nature and structure of self-efficacy belief systems; major sources of efficacy beliefs; processes through which they affect human functioning; developmental analysis of efficacy beliefs over life course; application of self-efficacy theory to cognitive development, health functioning, clinical dysfunctions, organizational functioning, and athletic performance; exercise of collective efficacy to accomplish social change.
1-3 units (Bandura) not given 1997-98

234. **Selected Topics in Affective Disorders**—(Undergraduates register for 154.) Current research topics in the study of affective disorders. Topics: epidemiology and phenomenology of affective disorders, psychological theories of depression, gender differences in affective disorders, cognitive and social functioning of depressed persons, psychobiology of affective disorders, depression in children, postpartum depression, suicide issues in the treatment of depression, and cultural aspects of affective disorders. Prerequisite: graduate standing in psychology or consent of instructor.
1-3 units, Spr (Gotlib)

235A. **Counseling Theories and Intervention from a Multicultural Perspective**—(Enroll in Education 233A.)
3 units (LaFromboise) given 1998-99
235B. Counseling Theories and Intervention from a Multicultural Perspective, Part B—(Enroll in Education 233B.)
3 units (LaFromboise) not given 1997-98

236. Psychophysiology—(Undergraduates register for 124.) Overview of psychophysiology, an empirical study of mind-body relations. Focus is on two response systems (electrodermal and cardiovascular) and applications to lie detection, emotions, and health. Critical thinking skills are emphasized; hands-on lab.
4 units (Gross) not given 1997-98

237. Career and Personal Counseling in Culturally Diverse Settings—(Same as Education 234.) Methods of integrating career and personal counseling with clients and counselors from differing backgrounds. Practice with selected assessment instruments. Case studies of biocultural role conflict. Informal supervised experience.
3 units (Krumbletz) not given 1997-98

238. Seminar on the Psychology of Gender—See 170. Prerequisite: graduate standing in psychology.
1-3 units (Carstensen) not given 1997-98

239. Advanced Cognitive Development—Current theory and research in cognitive development. Topics: Piagetian and other theoretical approaches; developmental aspects of perception, attention, memory, comprehension, communication, and social cognition. Prerequisite: 211 or consent of instructor.
1-3 units, Spr (Flavell)

240. Language Acquisition I—(Enroll in Linguistics 240.)
4 units (E. Clark) not given 1997-98

241. Language Acquisition II—(Enroll in Linguistics 241.)
4 units (E. Clark) not given 1997-98

242. Conceptual Organization and Development—(Undergraduates register for 144.) Theories and research in conceptual organization and development, critically evaluated. Topics: the acquisition of categories and category terms informed by the general problem of induction, by philosophical and psychological analyses of the nature of human categories (natural kind terms, family resemblances), by recent arguments how the acquisition of category terms is guided by constraints children place on possible word meanings, and by more traditional theories of cognitive development. Prerequisite: graduate standing in psychology or consent of instructor.
1-3 units (Markman)
alternate years, given 1998-99

243. General Development Seminar—Prerequisite: consent of instructors.
1-2 units, Win (A. Fernald, Flavell)

244. The Psychology of Aging—Critical examination of theory and research in gerontology. Normal and abnormal changes that occur in biological, cognitive, and psychological aging. Emphasis is on environmental factors that influence the aging process. Prerequisite: graduate standing in psychology or consent of instructor.
1-3 units (Carstensen) not given 1997-98

245. Graduate Seminar: Social Development—Theory and research on the development of social cognition and competence in infancy and childhood, integrating psychobiological and cultural perspectives. Topics: mother-infant attachment, parental belief systems and practices, and their influence on child development, emotional development, peer relations, sex differences and gender roles, and moral development. Prerequisite: consent of instructor.
1-3 units (A. Fernald) not given 1997-98

246. Perception Lecture Series—Current research topics in perceptual psychology, visual neuroscience, machine vision, and image processing. Speakers from research institutions in the Bay Area and around the world. Prerequisite: 203.
1 unit, Aut, Win, Spr (Heeger)

248. Introduction to Test Theory—(Enroll in Education 252.)
3-4 units, Spr (Haertel)

249A. Problems in Measurement: Item Response Theory—(Enroll in Education 353A.)
3 units (Haertel) not given 1997-98

250. Individual Counseling Psychology Methods—(Same as Education 227.) Techniques for helping individual clients learn successful procedures for coping with problems, e.g., shyness, depression, anxiety, obesity, and aggression.
3 units (Staff) not given 1997-98

252. Statistical Methods for Behavioral and Social Sciences—(Undergraduates register for 102.) For students with experience and training in empirical research. Analysis of data from experimental through factorial designs, randomized blocks, repeated measures; regression methods through multiple regression, model building, analysis of covariance; categorical data analysis through two-way tables, logistic regression. Integrated with the use of statistical computing packages. Prerequisites: Psychology or Education student, Education 160X; Statistics 190. (PSE)
1-6 units, Aut (Thomas)

253. Statistical Theory, Models, and Methodology—(Undergraduates register for 103.) Practical and theoretical study of advanced data analytic techniques such as loglinear models, signal detection, profile, trend, factor and discriminant analysis, and multivariate analysis of variance. Students an-
analyze data and write a research report weekly. Lab. Prerequisite: 252 or Education 257.
1-3 units, Win (Thomas)

254. Neuroimaging—Graduate seminar on the findings and methods of neuroimaging (functional MR, PET, EEG, MEG) relating to human perception and cognition. Prerequisites: graduate standing in neuroscience or psychology or consent of instructor.
1-3 units (Gabrieli, Heeger, Wandell)
alternate years, given 1998-99

255. Graduate Seminar: Selected Topics in Personality and Abnormal Psychology—Prerequisite: consent of instructor.
1-3 units, Aut (Horowitz)

257. Individually Supervised Practicum—Relevant teaching experience for graduate students as part of their program of study. Can be repeated for credit. Satisfies INS requirements for Curricula Practical Training. Prerequisites: graduate standing in psychology, consent of adviser.
3-5 units, Aut, Win, Spr (Staff)

258. Graduate Seminar in Social Psychology Research—For students who are already or are planning to become involved in research on social construal and the role that it plays in a variety of phenomena, notably the origin and escalation of conflict.
1-3 units, Aut, Win, Spr (Ross)

1-3 units, Spr (Zajonc)

1-3 units, Spr (Rumelhart)

261. Psychology of Problem Solving and Reasoning—(Same as Education 295.) Introduction to results and methods of research on cognitive processes of solving problems and reasoning. Focus is on accomplishments and limitations of research conducted since 1970, including views of cognition as situated activity.
3 units (Greene) not given 1997-98

262. Memory Systems—Recent findings indicate different kinds of memory are mediated by separable neural networks. Different patterns of memory failures are seen in a variety of neurological disorders and in terms of functional consequences for normal memory, such as unconscious learning. Prerequisites: 50, 201, or consent of instructor.
1-3 units (Gabrieli)
alternate years, given 1998-99

264. Selected Topics in Human Learning—Recent empirical and theoretical analyses of verbal learning, learning from text, learning of concepts, and intellectual skills. Emphasis is on information processing theories of memory and retrieval. Readings from recent research journals with topics determined partly by students’ interests. Discussion format. Prerequisite: 210 or consent of instructor.
1-3 units, Win (Bower)

265. Parallel Distributed Processing: Explorations in the Microstructure of Cognition—Advanced graduate seminar on the emergence of intelligence from the interaction of a large number of neuron-like elements. Focuses on current work in the application of brain-style computational models to psychological phenomena and to applications in artificial intelligence.
1-3 units, Aut (Rumelhart)

266. Topics in Perception—Current research topics in perceptual psychology, neurophysiology of perception, computational models, and computer vision. Topics: color vision, visual motion perception, binocular vision, shape perception, visual search, psychoacoustics, eye movements. Prerequisite: 203 or consent of instructor.
1-2 units (Heeger) not given 1997-98

267. Vision and Image Processing Laboratory—Topics in image processing and vision science through a combination of lectures and hands-on experience in a computer lab. Topics: image representation and image coding, sampling and filtering, image segmentation and mosaicing, image warping and morphing, and motion analysis.
1-3 units (Heeger)
alternate years, given 1998-99

269. Graduate Seminar in Personality Research—Can be repeated for credit. Prerequisite: graduate standing in psychology.
1-2 units, Aut, Win, Spr (Horowitz)

271. Applications of Social Psychology—See 156.

272. Special Topics in Psycholinguistics—May be repeated for credit. Prerequisite: consent of instructor.
1-3 units (H. Clark) not given 1997-98

275. Graduate Research—Intermediate level research undertaken with members of departmental faculty. Prerequisite: consent of instructor.
1-15 units (Staff)

276. Computational Neuroscience—Introduction to computational neuroscience: biophysics of computation; models of vision, audition, learning, and development; self-organizing networks. Emphasis is on theoretical and computational models and how to construct models of neurons and neural systems.
1-3 units, Aut (Heeger)
alternate years, not given 1998-99
277. Seminar on Emotion—Overview of emotion theory and research. What is an emotion? Biology and destiny. But we are not all the same! Feelings and faces. Reason and the passions. Focus is on experimentally tractable ideas. Prerequisites: 1, consent of instructor.

1-3 units, Aut (Gross)


1-3 units (Steele) alternate years, given 1998-99

280. Doctoral Research—For dissertation. Prerequisites: consent of instructor.

1-15 units (Staff)

281. Practicum in Teaching—Enrollment limited to students serving as teaching assistants in selected psychology courses. Can be repeated for credit.

3-5 units, Aut, Win, Spr (Staff)

283. Interdisciplinary Seminar on Conflict Resolution—(Same as Economics 386, Engineering-Economic Systems and Operations Research 489, Law 611.) Addresses problems of conflict resolution and negotiation from an interdisciplinary perspective. Presentations by faculty and by scholars from other universities.

1-2 units, Win (Alexander, Arrow, Ross, Wilson)

288. Becoming a Professional Psychologist: A Practicum—Tactics and strategies for getting a job and keeping it. Enrollment limited to psychology graduate students beyond the first year.

2-3 units (Zimbardo) alternate years, given 1998-99

289. Religious Sensibility and the Establishment Clause—(Same as Law 568.) The historical background to the Establishment clause, psychological and sociological literature about religiosity. Emphasis is on the nature of absolute beliefs, the relations between beliefs and behavior, and the problems ardent beliefs pose in a democracy. How is the line drawn between the requirements of democracy and the imperatives of belief?

1-3 units (Rosenhan) not given 1997-98

290. Law and Social Science—(Same as Law 229.) Viewing social science as an analytic tool, examines its role in American legal process. The relevance of social science theory and empirical findings for such issues as copyright, deterrence, human responsibility, desegregation, fair employment, and jury dynamics. The nature of expertise and its relevance to these matters. Emphasis is on the scientific method and its relevance to legal analysis.

2-3 units (Rosenhan) not given 1997-98

294. Seminar on Development of Children’s Knowledge about the Mind—See 143.

296. Methods in Personality and Social Psychology—Focus is on developing and consolidating a set of methodological skills in personality and social psychology and in allied disciplines (sociology, education, and communication). Experimental survey and multivariate methods. Topics: formulating the research problem, experimental and quasi-experimental design, going from abstract ideas to concrete instances, measuring and analyzing change data, observational techniques, handling research artifacts, professional and ethical issues, triangulation, archival and correlational studies, validity and reliability of measurement, organizing data. Practicum format; students develop a real research proposal over the course of the quarter.

1-3 units (Steele) not given 1997-98

297. Seminar for Coterminal Masters’ Students—Discussion of contemporary issues and student research. Student and faculty presentations.

1-2 units, Spr (L. Ross)

298. Contemporary Topics in Social Psychology—Limited to graduate students in social psychology. In-depth analysis of selected issues in contemporary life understood from various social psychological theories and perspectives. Prerequisites: 207, 212.

2-4 units, Win (Zajonc)

299. Effective Teaching—Seminar designed to enhance teaching effectiveness for graduate TAs within the department. Covers all major topics in undergraduate education in psychology; planned and developed in conjunction with advanced-level graduate students.

1 unit (Zimbardo, Rosenhan) alternate years, given 1998-99

300. Psychology and Law Proseminar—(Same as Law 376.) Legal, psychological, and popular views of morality, responsibility, equity, intention, insanity, evidence, crime, and punishment; the police; psychological processes in jury deliberation, homicide and aggression; treatment of accused persons. Prerequisite: graduate standing in psychology or law, or consent of instructor.

3 units (Rosenhan) not given 1997-98
by focusing their studies in one of several areas of concentration. The areas of concentration may
completing the core, students apply these skills values that often animate the policy debate. Af-
ing the sharp conflicts in fundamental human in the effectiveness of policies, and appreciat-
velopement of the tools of policy analysis. A list of recom-
end of the second week of Autumn Quarter in
when the student selects an area of concentra-
be approved by an adviser, who is appointed when the student selects an area of concentra-
quire for Public Policy majors must be
grade point average (GPA) of 2.0 or higher.
nominate for the A.B. degree, students must
deal with a specific field of public policy, with
types of institutions, or with deeper development
of concentration are:
Advanced Methods of Policy Analysis
Business Policies
Design of Public Institutions
Development and Growth Policies
Education
Environment, Resources, and Population
Health Care
International Policies
The Law and Legal System
Science and Technology Policy
Social Policy: Discrimination, Crime, Poverty
Urban and Regional Policy
Completion of the program in Public Policy requires 88 units of course work:
1. Forty-five units of prerequisite courses: Political Science 1 or 10; Economics 1, 51, 52, 80, 102; Sociology 160 or Industrial Engineering 100; and sufficient calculus to satisfy the pre-
quisites of Economics 51 (Math. 43 or 51, or Economics 180). In addition, students are en-
couraged to take at least one course in linear algebra.
2. The 25-unit sequence of 5-unit core courses, which students should plan to complete by the end of their junior year (see below for descriptions 101-105). To satisfy the core requirement in Organizations, students may take Public Policy 102A or 102B, and in Philosophy, stu-
dents may take Public Policy 103A or 103B.
3. During the senior year, majors must complete 15 units of course work in a problem-focused area. The 15 units of post-core course work must be approved by an adviser, who is appointed when the student selects an area of concentra-
tion. This usually is done midway through the junior year, and must be done no later than the end of the second week of Autumn Quarter in the senior year.
4. Seniors are required to participate in one quarter of the Senior Seminar (Public Policy 200). Majors also must submit at least one research paper during the senior year and present it before the Senior Seminar. The senior paper may be a term paper for either the senior sem-
inor or another course or an honors thesis.
5. A maximum of 10 units may be taken on a Satis-
factory/No Credit basis in the prerequisite courses for the Public Policy Core. All cours-
es required for Public Policy majors must be taken for a letter grade.
6. Students must complete the Public Policy core and their concentration area courses with a grade point average (GPA) of 2.0 or higher.
7. To become a major in Public Policy and to be nominated for the A.B. degree, students must
Government plays an important, ubiquitous role in contemporary society. Moreover, the growing complexity of public policies, the political pro-
cesses that give rise to them, and the organizations that implement them have created a need in gov-
ernment, business, and the nonprofit sector for people who understand how government operates. The Public Policy Program provides students the foundational skills and institutional knowledge necessary for understanding the policy process and provides an interdisciplinary course of study in the design, management, and evaluation of public sector programs and institutions. The major in Public Policy is useful as preparation for employ-
ment as an analyst in government agencies or business, as a foundation for postgraduate profes-
sional schools in business, education, law, and public policy, and as preparation for graduate study in the social sciences, especially economics, political science, and sociology.

UNDERGRADUATE PROGRAMS
BACHELOR OF ARTS

The core courses in the Public Policy Program develop the skills that are necessary for under-
standing the political constraints faced by policy makers, assessing the performance of alterna-
tive approaches to policy implementation, evaluat-
ing the effectiveness of policies, and appreciat-
ing the sharp conflicts in fundamental human values that often animate the policy debate. Af-
der completing the core, students apply these skills by focusing their studies in one of several areas of concentration. The areas of concentration may
complete an application, available in Building 60, room 61B. For additional information drop by or phone (650) 723-3452.

The Public Policy Program offers three courses to prepare students for making effective academic use of an internship (Public Policy 179A,B, 182). Students may also participate in the Integrated Scholar Intern Program, combining directed reading and research with an internship.

MINORS

The Public Policy Program offers a minor that is intended to provide students with interdisciplinary training in applied social sciences. Students who pursue the minor are required to take at least three of the five core courses, and a total of 35 units in Public Policy and its supporting disciplinary departments. Because University rules prohibit double-counting of courses, the requirements for a minor differ according to the student’s major requirements.

For students whose major department or program requires no courses in economics, political science, or sociology, the requirements for a Public Policy minor are:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics 1, 51; Public Policy 104</td>
<td>15</td>
</tr>
<tr>
<td>Political Science 1 or 10; Public Policy 101 or 103</td>
<td>10</td>
</tr>
<tr>
<td>Sociology 160, Public Policy 102</td>
<td>10</td>
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</tbody>
</table>

For students who are Economics majors or who satisfy a major requirement by taking Economics 51, but no courses in political science, the requirements for a Public Policy minor are:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Political Science 1 or 10, Public Policy 101</td>
<td>10</td>
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<tr>
<td>Public Policy 103</td>
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<tr>
<td>Public Policy 104</td>
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<tr>
<td>Sociology 160, Public Policy 102</td>
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</tbody>
</table>

For students who are Political Science majors or who satisfy a major requirement by taking either Political Science 1 or 10, but no courses in Economics, the requirements for a Public Policy minor are:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
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<td>Sociology 160, Public Policy 102</td>
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</table>

For Sociology majors, the requirements for a Public Policy minor are:

<table>
<thead>
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<tr>
<td>Public Policy 102</td>
<td>5</td>
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<tr>
<td>Public Policy 103</td>
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</tbody>
</table>

For students who major in another interdepartmental program (such as International Relations) and who satisfy major requirements by taking both Economics 51 and Political Science 1 or 10, the requirements for a Public Policy minor are:

HONORS PROGRAM

The Public Policy Program offers students the opportunity to pursue honors work during the senior year. In order to graduate with honors in Public Policy, a student must:

1. Apply for admission to the honors program no later than the end of the second week of Autumn Quarter of the senior year.
2. Complete the requirements for the A.B. in Public Policy and achieve a grade point average (GPA) of 3.3 in the following courses: the Public Policy core, the student’s concentration area courses, the Senior Seminar, and Public Policy 199 (senior research). Courses not taken at Stanford are not included in calculating the GPA.
3. Enroll in at least 10 but no more than 15 units of Public Policy 199 during the senior year and receive a final grade on the senior thesis of at least a ‘B+.’

Students who intend to pursue honors work should plan their academic schedules so that most of the core courses are completed before the beginning of the senior year, and all of the core and concentration courses are completed by the end of Winter Quarter of senior year. This scheduling gives students both the time and the necessary course background to complete a senior research project in Spring Quarter. In addition, juniors who may wish to pursue a senior thesis are encouraged to enroll in Public Policy 197 (Junior Honors Seminar) during Winter Quarter. This course focuses on developing a research plan and the research skills necessary to complete a thesis.

To apply, a student must submit a completed application to the Public Policy Program office with a brief description of the thesis. The student must obtain the sponsorship of a faculty member who approves of the thesis description and who agrees to serve as a thesis adviser. Students intending to write a thesis involving more than one discipline may wish to have two advisers. To be admitted to the honors program, students must:

1. Submit a completed application for honors work to the Public Policy Program office by the end of the second week of Autumn Quarter of the senior year.
2. Achieve a GPA of at least 3.3 in Public Policy courses by the end of the junior year.

The honors thesis must be submitted to both the thesis adviser and the Public Policy Program office. Graduation with honors requires that the thesis be approved by both the adviser and the Director of the Public Policy Program. The role
of the director is to assure that the thesis deals with an issue of public policy and satisfies the standards of excellence of the program. However, the grade for the honors thesis is determined solely by the adviser. The thesis adviser sets the deadlines for receiving the final draft of the thesis; however, the director sets the deadline for theses to be considered for University and department awards. In order to graduate with honors at the Spring commencement, a student must submit a final bound copy of the thesis to the Public Policy Program office no later than Friday, June 5. In order to be considered for awards given to outstanding senior theses, a student must submit a copy of the thesis to the Public Policy Program office no later than Wednesday, May 20.

Members of the core faculty in Public Policy are listed above and are available to provide assistance in selecting a senior thesis topic. For additional information, contact the Public Policy Program office.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

50. Current Trends in Policy Making—Guest speakers address current policy issues (the environment, health care, education, and the budget). These policies are discussed, stressing the interactive learning that puts students in the positions of the policy makers.

3 units, Spr (Cogan, Brady, Noll)

101. Politics and Public Policy—(Same as Political Science 101P.) The domestic policy-making process, emphasizing how elected officials, bureaucrats, and interest groups shape government policies in various areas including tax, environmental, and social-welfare policy, given their goals and available tactics. How public policies are formulated and implemented. The results of this process using equity and efficiency criteria. Prerequisite: Political Science 1 or 10.

5 units, Spr (Weingast)

102A. Organizations and Public Policy—(Same as Sociology 166/266.) Concepts and methods for analyzing the influence of organizations on the setting and implementation of public policy. Varying conceptions of organizations as corporate actors and as social contexts. Roles of organizations in relation to public policy; organizations as decision makers and problems solvers, as change agents, and as clients. Prerequisite: Sociology 160 or Industrial Engineering 100. GER:3b (DR:9)

5 units, Win (Scott)

102B. Organizations and Public Policy—Analysis of public organizations stressing problems of effective management and incentives in a non-market environment. Prerequisite: 160, or Industrial Engineering 100.

5 units, Spr (Bendor)

103A. Introduction to Political Philosophy—(Same as Philosophy 30.) Concepts of equality, justice, tolerance, liberty, utility, and rights approached through major works in political philosophy. Each work presents a distinct and systematic conception of human nature and the social and economic conditions of a just association which expresses that nature. Readings: Hobbes, Locke, Mill, Marx, Rawls. GER:3a (DR:8)

5 units, Aut (Gruen)

103B. Ethics and Public Policy—(Same as Science, Technology, and Society 110.) Ethical issues in science- and technology-related public policy conflicts. Develops the capacity for rigorous critical analysis of complex, value-laden policy disputes. Topics: the natures of ethics and morality; the natures of and rationales for liberty, justice, and human rights; and the use and abuse of these concepts in recent and current policy disputes. Cases from: biomedicine, environmental affairs, the technical professions, communications, and international relations. GER:3b (DR:8)

5 units, Win (McGinn)

104. Economics and Public Policy—(Same as Economics 150.) The relationship between micro-economic analysis and public policy making. How economic policy analysis is done and why political leaders regard it as useful but not definitive in making policy decisions. Economic rationales for policy interventions, methods of policy evaluation and the role of benefit-cost analysis, economic models of politics and their application to policy making, and the relationship of income distribution to policy choice. Readings: theoretical foundations of policy making and policy analysis, and applications to the adoption and implementation of programs in several areas. Prerequisite: Economics 51.

(WIM)

5 units, Win (Noll)

105. Quantitative Methods and their Application to Public Policy—Applications of statistical methods, rather than methodology per se. Risk assessment in the evaluation of biohazards and medical techniques and technologies; comparisons of such information-gathering techniques as surveys, experiments, or simulation studies; methods of expressing and evaluating uncertainty; and the interpretation of such quantitative techniques of data analysis as regression. Prerequisites: Economics 80 and 102.

5 units, Spr (Rothwell)

179A. Preparation for Internship Learning—Introduction to the campus resources available for finding an internship; opportunities to interact with Stanford students and local community leaders who
have served as internship supervisors; and off-campus field study in the local community to explore potential internship sites and practice data gathering skills.

2 units, Win (Luce, Schmidt-Posner)

179B. Preparation for Internship Learning—Provides students with the knowledge and skills necessary for effective learning through an internship. Introduction to the theory and practice of self-directed "field" learning (e.g., clarifying goals and objectives, critical reflection on experience, understanding the interaction between experience and analysis in field research, and assessing experiential learning). If appropriate, students are placed with faculty who serve as sponsors of internship-related directed study. Prerequisite: 179A, or consent of instructor.

1 unit, Spr (Luce)

182. Policy Making and Problem-Solving at the Local and Regional Level—Public policy issues, processes, and organizations at the local and regional level. Focus: public and non-profit sector institutions and organizations; structure and context of community problem-solving and local policy formulation, implementation, and analysis. Case study investigation of public issues in the community, e.g., homelessness, toxic waste disposal, child care, land use planning. Opportunity to learn from local policy makers and community leaders.

4 units, Spr (Stanton)

195. Business and Public Policy—The multi-faceted relationships between business, government, and interest groups, with emphasis on companies and interest groups as strategic actors in the "non-market environment." Companies attempt to shape public policy through government processes and international politics; interest groups attempt to shape public policy through government processes and by exerting direct influence on businesses; politicians attempt to mediate conflicts of interest between and among businesses and interest groups. Each relationship transcends the conventional view of a business as an exclusively or predominantly market focused entity that takes as given government actions and ignores interest groups and their collective actions. Modules: media and private collective action, business strategies in government arenas, international business and the nonmarket environment, and corporate responsibility and ethics.

5 units, Spr (Staff)

196. The Political Economy of the Federal Budget—Applies the tools of economic analysis to study how the federal government makes its budgetary decisions. Factors that have contributed to the growth in federal spending, taxation, and the national debt; congressional and executive branch budget processes and their effects on government policy-making; spending programs (Social Security, Medi-care, welfare, and infrastructure programs). Prerequisites: Economics 51, 52 (Economics 52 may be taken concurrently).

5 units, Aut (Cogan)

197. Junior Honors Seminar—Primarily for students who expect to write an honors thesis. Weekly sessions discuss writing an honors thesis proposal (prospectus), submitting grant applications, and completing the honors thesis. Readings focus on writing skills and research design. Students select an adviser, outline a program of study for their senior year, and complete a prospectus by the end of the quarter. Seniors working on their theses also may enroll and present their research to the seminar participants. Seniors are required to make substantial progress on their thesis by the end of the quarter.

3 units, Win (Rothwell)

198. Directed Readings in Public Policy—1-5 units (Staff)

199. Senior Research—1-15 units (Staff)

200A,B,C. Senior Seminar—Designed to give Public Policy students the opportunity to make oral presentations and to write a seminar-length paper on a topic in public policy. Topic and methods of analysis used are determined by student in consultation with instructor. A limited number of lectures and seminars deal with the question of how to conduct "good" research in public policy. Prerequisites: completion of core courses in Public Policy or consent of the instructor.

200A. 3 units, Aut (Rosston)
200B. 3 units, Win (Rosston)
200C. 3 units, Spr (Rosston)

201. Theories of International Cooperation and Conflict—Theories about conditions that promote cooperation or conflict between states. Objective: to identify strategies that promote cooperative solutions to international disputes and evaluate those strategies in terms of their historical effectiveness. The application of game theoretic models of rational action as tools for assessing relations between nations.

4 units, Spr (Bueno de Mesquita)
The purpose of Religious Studies is to understand and interpret the history, literature, thought, and social structures of various religious traditions and cultures. The department offers courses at several levels, described below.

**UNDERGRADUATE PROGRAMS**

**BACHELOR OF ARTS**

The general requirements for an A.B. in Religious Studies are 60 units of course work in the department (no more than 10 units of which can be taken Satisfactory/No Credit), including 9 to 15 units in introductory courses (numbered 1-89). At least two introductory courses must be in diverse religious traditions (see below). At least 40 units are to be taken in courses numbered above 100, including no fewer than three seminars numbered above 200. All majors are required to take 290, Majors Seminar. Up to 10 units of directed reading may count towards the major.

In meeting these requirements, a student is expected to structure a coherent program of study in consultation with his or her adviser. This may be done in a number of ways. The student may choose to concentrate in one of three areas: Religious Traditions; Ethics and Philosophy of Religion; or Religion, Culture, and Comparative Studies. Religious Traditions consists of three subfields: East Asian Religions, Judaism, and Christianity. Alternatively, the student may construct a self-designed concentration across these (or other) areas, again in consultation with the adviser.

The student is expected to take a minimum of 25 units in the area of concentration. Relevant courses listed in one area may, with the written consent of the Undergraduate Director, be counted in another. Approved courses offered by other departments may also be counted.

**MINORS**

The minor requires at minimum seven courses of 3 or more units for a minimum of 30/maximum of 36 units of graded work. Students must complete two introductory courses (numbered 1-89), at least two topics in religion courses (numbered 101-189) and at least one seminar (numbered 201-289). Remaining units must be taken in courses numbered 101 and above. One course in directed reading (199) may count towards the minor, and students may petition for other Stanford courses to fulfill minor requirements. Students are strongly encouraged to focus their program of study in one of the established department areas of concentration, but may also design the minor to supplement their major. Examples of minor concentrations are available from the department administrator. Minors must take courses from at least two Religious Studies faculty members. Students must declare the minor no later than the last day of the quarter two quarters before degree conferral.

It is possible for minors to write a senior essay in Religious Studies, but only with the consent of the Undergraduate Director and the student’s major adviser. Students writing the senior essay are required to complete 197 (Senior Essay) in addition to the minor course requirements, and should plan on one directed reading course as part of their program requirements (199).

**SENIOR ESSAY/HONORS**

Majors in Religious Studies (RS) are encouraged to write a senior essay in Religious Studies. The essay allows students to apply knowledge and skills learned in the classroom to a topic of personal interest. It also provides a focused research experience under the tutelage of a Religious Studies faculty member, thereby offering students a chance to improve research and writing skills indispensable to graduate work in the humanities and useful in a wide variety of professions.

The essay may be on any approved topic in Religious Studies. Students should begin conversations about the senior essay with Religious Studies faculty and the Undergraduate Director soon after declaring the Religious Studies major. While the bulk of the essay is generally written during the senior year, students are advised to begin conceptualizing a project at the end of the junior year in order to take advantage of summer research opportunities. Students unsure about which faculty member would be most knowledgeable in the area of interest should ask the undergraduate assistant in the department for a copy of the leaflet, *Religious Studies at Stanford*. A proposal for the senior essay, consisting of a completed application form, a copy of the transcript, and a one-to-two page description of the topic signed by the prospective essay adviser, should be submitted by the end of Spring Quarter of the junior year, and in no case later than the end of third quarter prior to graduation. The application is then reviewed by the Undergraduate Director who either approves the project or requests resubmission with revisions.

Students must take RS 197 (Senior Essay) for a letter grade and 3 to 5 units in the senior year while writing the thesis. These units are in addition to the total number of units (60) required for successful completion of the major. Students are allowed up to 10 letter grade units in senior essay. Essays-in-progress are also discussed in the Majors Seminar, RS 290.

Senior essays of exceptional merit are submitted to the Religious Studies faculty for honors con-
Consideration. There is no honors essay in Religious Studies; rather, all senior essays are eligible for receiving the honors distinction if the essay receives a grade of ‘A’ or ‘A-.’ Those who successfully earn honors are acknowledged publicly during the department’s commencement exercise, and the honors distinction is also recorded on the final University transcript.

Further details and guidelines for the senior essay are available from the department undergraduate assistant.

**MAJOR IN RELIGIOUS STUDIES AND PHILOSOPHY**

The departments of Religious Studies and Philosophy jointly nominate for the A.B. students who have completed a major in the two disciplines. See a description of this joint major under the “Philosophy” section of this bulletin, or in the guidelines available from the undergraduate director of either department.

**GRADUATE PROGRAMS**

**MAJOR OF ARTS**

University regulations pertaining to the A.M. are listed in the “Graduate Degrees” section of this bulletin. The following requirements are in addition to the University’s basic requirements.

The student completes at least 36 units of graduate work at Stanford beyond the A.B. degree, including a required graduate seminar (304A or B). Residence may be completed by three quarters of full-time work or the equivalent.

The student’s plan of courses is subject to approval by the Graduate Director. No field of specialization is expected, but students may focus work in particular areas. Advanced and graduate courses in other departments may be taken. No thesis is required; a thesis, if elected, may count for as many as 9 units.

Each student demonstrates reading knowledge of at least one foreign language.

**DOCTOR OF PHILOSOPHY**

University regulations regarding the Ph.D. are found in the “Graduate Degrees” section of this bulletin. The following requirements are in addition to the University’s basic requirements.

**Residence**—Each student completes three years (nine quarters) of full-time study, or the equivalent, in graduate work beyond the A.B. degree, and a minimum of 72 units of graduate course work (excluding the dissertation).

**Field of Study**—The Ph.D. signifies special knowledge of a field of study and potential mastery of an area of specialization within it. The faculty of the department has established certain fields of study in which its strengths and those of other Stanford departments cohere. They are: East Asian religions, Judaic studies, Western religions, and modern Western religious thought. Students who wish to specialize in other fields must obtain early approval by the faculty.

**Stages of Advancement**—The three stages through which the student advances to the degree are: (1) in the first two years, the student refines an area of specialization within the chosen field of study in preparation for candidacy; (2) after attaining candidacy, the student concentrates on the area of specialization in preparation for the qualifying examination; (3) the student writes a dissertation and defends it in the University oral examination.

**Languages**—Each student demonstrates a reading knowledge of two foreign languages, including French or German. Each student also demonstrates reading knowledge of other ancient or modern languages necessary for the field of study, the area of specialization, and dissertation topic.

**Courses**—Each student satisfactorily completes the two graduate seminars (304A and B) before the candidacy decision. Other courses are taken with the approval of a faculty adviser in consideration of the student’s field of study.

**Candidacy**—At the end of each academic year, the department’s faculty recommend second-year students for candidacy on the basis of all relevant information, and especially on the student’s candidacy dossier which includes the approved declaration of an area of specialization, certification for one foreign language, and two substantial papers written for courses during the previous two years.

**Teaching Internships**—At least two teaching internships under the supervision of faculty members are undertaken at a time negotiated with the Graduate Director. Students receive academic credit for the required internships, which are projects of academic training and not of employment.

**Qualifying Examination**—To qualify for writing a dissertation, the student must successfully pass a comprehensive examination in the chosen field and the area of specialization.

**Dissertation**—The dissertation contributes to the humanistic study of religion and is written under the direction of the candidate’s dissertation adviser and at least two other members of the Academic Council. The University oral examination is a defense of the completed dissertation.

**JOINT Ph.D. IN RELIGIOUS STUDIES AND HUMANITIES**

Religious Studies participates in the Graduate Program in Humanities leading to the joint Ph.D. in Religious Studies and Humanities described in the "Humanities Special Programs" section of this bulletin.
Course levels:
1-89 Introductory (4 units)
101-189 Undergraduate Lecture Courses (4 or 5 units)
197-199 Undergraduate Directed Reading (variable units)
201-290 Undergraduate Seminars (4 or 5 units)
299 Graduate Directed Reading (variable units)
301-399 Graduate Seminars, Research, and Teaching (variable units)

INTRODUCTORY COURSES

1. Introduction to Religion—Cross-disciplinary approach to the beliefs, practices, experiences, and institutions that to individuals of diverse epochs and cultures have comprised the phenomenon we call religion. Issues: prophets and founders; God and the gods; scriptures and their interpretation; annual and life-cycle rituals; faith, reason, and mysticism; the impact(s) of modernity. GER:3a (DR:8)
4 units, Aut (Eisen, Hess)

2. Eastern and Western Conceptions of the Self—Analysis and comparison among models of the self in various traditions, notably classical Greek, Christian, Confucian, Buddhist, Taoist, and Freudian. Limited enrollment.
4 units (Yearley) not given 1997-98

4N. Stanford Introductory Seminar: The Evolution of Early Christian Doctrine—God as Trinity, and Christ as Divine and Human—Preference to freshmen. How did early Christians come to assert that the Christian God is "Trine" (Father, Son, and the Holy Spirit), and that Jesus Christ is fully divine and fully human? What passages within the Bible were debated as these doctrines came to expression in the Creeds of Nicaea and Constantinople (325 and 381 A.D.) and the "symbol" of Chalcedon (451 A.D.)? What roles did philosophy and politics play in these "defining moments" in the history of Christianity? Readings from primary texts of period theologians, historians, and philosophers. GER:3a (DR:8)
3-4 units, Aut (Gregg)

6N. Stanford Introductory Seminar: Readings in Asian Religions—Preference to freshmen. Several classic texts from diverse cultural settings and religious traditions: Bhagavadgita, a formative treatise of early Hinduism; the Chuang Tzu, a classic statement of philosophical Taoism; and the Skhobogenzo, a collection of essays on Zen Buddhism. Texts are placed in historical and intellectual context, exploring the philosophical and religious teachings as responses to issues posed by earlier tradition. Notions of self and self-cultivation, the relationships between personal and social ethics, follow from these notions. GER:3a (DR:7 or 8)
3 units, Win (Bielefeldt)

7N. Stanford Introductory Seminar: Gospel of John—Its Early History as a Controversial Text—(Enroll in Classics 19N.)
3 units, Spr (Gregg)

8. Religion in America—Interdisciplinary introduction to the diversity of religious communities in the U.S. Important religious events, figures, and developments in American religions. Topics: indigenous worldviews, popular religions, civil religion, religion and social conflict, and new religious expressions. GER:3a (DR:8)
4 units (Busto) not given 1997-98

9N. Stanford Introductory Seminar: Ethical Status of Non-Human Animals—(Same as Philosophy 14N.) Preference to freshmen. Exploration of a range of western philosophical views, classical and modern, concerning the ethical status of non-human animals. Focus is on a few standard ethical theories, e.g., utilitarianism and inalienable rights, and the plausibility of extending these theories to non-human animals. GER:3a (DR:8)
3 units, Spr (Ivanhoe)

11. Religious Classics of Asia—Important texts from S. Asia, including discussion of the idea of text; culture-specific ways of receiving and interpreting texts; interactions of such categories as oral and written, classical and folk, elite and popular in Indian traditions. Texts: Upanisads, Sattipathana Sutta, Bhagavad Gita, Ramayana, Devi Mahatmya, devotional poetry, and drama. Emphasis is on Hinduism, with materials from S. Asian Buddhism, Jainism, and Islam. GER:3a (DR:8)
4 units, Win (Hess)

14. Introduction to Buddhism—Introduction to the life and teachings of the canonical Buddha, and to the various Buddhist cultures that have drawn inspiration from the movement he created. Materials from India, China, Japan, and Tibet are examined in terms of their doctrinal content, institutional basis, ritual context, and implications for the changing Buddhist understandings of the path to liberation.
4 units (Faure) not given 1997-98

15. The Hebrew Bible: Issues of Power—Fundamental concepts and contradictions in the history of pre-exilic Israel, emphasizing the transition from tribal confederation to national kingdom found in the biblical books of Exodus, Judges, and Samuel. The interrelationship of power struggles between the human and the divine; historical clashes between Israel and its ancient neighbors. Moses as reluctant prophet, David as ambitious king. Emphasis is on the nature of Israel’s political community and the relations between power and authority, political and sacred order. Four evening films.
GER:3a (DR:7 or 8)
4 units, Win (Bach)
18. Zen Buddhism—Introduction to classical Zen thought in China, its background, origins, and development. GER:3a,4a (DR:2 or 8)
   4 units, Spr (Bielefeldt)

   4 units (Faure) not given 1997-98

23. Introduction to Judaism—Historical development of Jewish religious thought and practice, from the biblical period to the present. Various kinds of texts reflecting that development: scriptural, liturgical, midrashic, legal, historical, and philosophical.
   GER:3a (DR:8)
   4 units, Win (Lawee)

24. Introduction to Christianity—The historical development of Christian religious thought and practice from Jesus to the present. Emphasis is on the formation of Christianity's major teachings and their transformation and diverse expressions in the medieval, reformation, and modern periods. Readings focus on primary texts.
   GER:3a (DR:8)
   4 units, Aut (Sockness)

25. Introduction to New Testament Literature—The more important writings in the New Testament (and several non-canonical early Christian works) and recent scholarly treatment of this body of literature. Emphasis is on the historical and social dynamics which influenced the New Testament's leading ideas, including its differing portraits of Jesus and its several understandings of divine action.
   4 units (Gregg) not given 1997-98

26. Early Christianity—(Same as Classics 104.) The Christian movement to 600 A.D., emphasizing its distinctive beliefs and practices, the importance of Christianity to changes within the late-Roman world, and emergent beliefs and practices that distinguished Christians from other groups and among themselves. Primary documents (ancient texts in translation) and surviving art and architecture show early Christianity's modes of community organization, debates about orthodoxy and heretical teaching, and interaction with other religions. Thematic interests concern deployment of "holy power" in people, places, rituals, objects.
   GER:3a (DR:8)
   5 units, Win (Gregg)

27. Introduction to Islam—The beginning of Islam as a religious tradition and its unfolding into a world religion. Focus is on the history of the founder and the elements that constitute a Muslim world view: beliefs, rituals, scripture and prophecy. Some tools and insights in order to understand contemporary Islam.
   GER:3a (DR:8)
   4 units, Aut (Moosa)

29. Imagining Jewish Civilization—(Same as History 88.) Interdisciplinary introduction to the various forms of Jewish self-expression, literature, religion, and history from the Biblical period to the present. Topics: power and powerlessness, conflicting notions of the divine, evil, beauty, community, gender, and learning through the ages. Guest lectures, films, reading of primary and secondary texts.
   5 units (Eisen, Zipperstein) not given 1997-98

30. Modern Christian Theology: Issues and Problems—The challenges to Christian belief posed by modernity (e.g., the historical reliability of Christian scriptures, the rise of secularism as a world view, the historicization of human thought and culture, the quest for political justice and liberation, the rise of protest atheism, the presence of "other" religions, the meaning of religious discourse in a scientific age) and responses to these challenges by classic and contemporary Christian thinkers since the Enlightenment (e.g., Schleiermacher, Kierkegaard, Troeltsch, Barth, Tillich, Bultmann, Bonhoeffer, Küng, Ogden, Boff, Reuther, McGague). Specific issues and figures rotate.
   4 units (Sockness) not given 1997-98

42. Philosophy of Religion—Classic and modern questions in the philosophy of religion traced through Western and Eastern traditions: coherence of theism, relativism, verification and ethics of belief, implications of science. Readings include traditional and modern texts.
   GER:3a (DR:8)
   4 units, Aut (Gelber)

43Q. Stanford Introductory Seminar: Finding Your Voice—Rites of Passage and Identity in 20th-Century Fiction—Preference to sophomores. Through reading contemporary fiction, examination of the power of multiple identities, including race, gender, sexual orientation, ethnicity, and religious tradition in shaping one's life. Each student keeps a journal related to the readings.
   GER:3a (DR:8)
   3 units, Aut (Bach)

44Q. Stanford Introductory Seminar: Philosophical Views of Nature—(Same as Philosophy 75Q.) Preference to sophomores. Examination of a variety of philosophical views about the relationship between human beings and Nature. Examples from traditional Chinese thought; contemporary Western accounts, particularly those which explicitly seek to establish philosophical justifications for environmental concern.
   GER:3a (DR:8)
   3 units, Spr (Ivanhoe)

53. Jews and Judaism in America—Examination of the interaction between the character of the American Jewish community and the forms of Judaism developed in this country, against the background of American ethnicity. Historical, literary, sociological, and theological materials are used.
   GER:3a (DR:8)
   4 units (Eisen) not given 1997-98

55. Introduction to Chinese Thought—(Same as Philosophy 46.) Religious and philosophical thought of early China, especially the "Classical" period,
550-200 B.C. Development of Chinese thought as an extended dialogue among thinkers who provided an uncommon and often contradictory answers to a common set of problems. Limited enrollment. GER:3a (DR:8)
4 units (Ivanhoe) not given 1997-98

65. Introduction to Christian Ethics—Concepts, sources, and methods employed in the ethical reflections of major Christian thinkers from traditional to contemporary (e.g., Augustine, Aquinas, and Stanley Hambraus). Their understandings of society, the meaning of our lives, the kind of people we ought to be, and how we make practical moral judgments.
4 units not given 1997-98

80. Introduction to Rabbinic Culture—The genres of rabbinic culture and issues which have shaped its worldview in different times and places. Selections (in English translation) from midrash, Mishna, Talmud, codes, and responses. The legitimacy of rabbinic authority, the value of Oral Torah, discipleship, the lure of the hypothetical, the relationship between custom and law, the nature and place of dissent, the creeping expansion of the realm of norms, the challenge of modernity.
4 units, not given 1997-98

UNDERGRADUATE LECTURES
ASIAN RELIGIONS
113. Zhuang Zi—(Same as Philosophy 113/213.) The history of Western philosophical interpretations of the Daoist text, Zhuang Zi. Survey of interpretations, emphasizing works of A. C. Graham, Chad Hansen, Wu Kuang-ming, Lee Yearley, and David Wong. No knowledge of Chinese is required. Separate readings for those who know Classical Chinese. Prerequisite: 55 or consent of instructor.
5 units (Ivanhoe) not given 1997-98

116. Japanese Buddhism—The history and teachings of Buddhism in Japan, emphasizing the early and medieval periods. GER:3a (DR:8)
5 units (Bielefeldt) not given 1997-98

117. Syncretism and Sectarianism in Chinese Buddhism—Dialectical relationships between sectarian and syncretic tendencies, conservative and subversive elements, and orthodoxy and heterodoxy in the development of Chinese Buddhism. Prerequisite: consent of instructor.
5 units (Faure) not given 1997-98

118. Ritual in East Asian Buddhism—Rituals and symbolic representations of the relationship between the sacred and profane in E. Asian religious traditions.
4 units (Faure) not given 1997-98

119. Neo-Confucianism—(Same as Philosophy 114/214.) Introduction to later Confucian thought as represented in the Song through Qing dynasties.
4 units (Faure) not given 1997-98

Introduction to Buddhist concepts which provided some of the theoretical foundations for reinterpretation of Confucian thought in its later phase. The thought of Cheng Hao, Cheng Yi, Zhu Xi, Wang Yangming, Dai Zhen, and Zhang Xuecheng. Prerequisite: 55 or consent of instructor.
4 units, Win (Ivanhoe)

5 units, Spr (Moerman)

136. Buddhist Yoga—Introduction to Buddhist models of spiritual practice, with emphasis on issues in the interpretation of the contemplative path, Limited enrollment.
4 units (Bielefeldt) not given 1997-98

150. Mahayana Buddhism—Introduction to the Lotus school of Mahayana; its Indian sources, Chinese formulation, and Japanese developments.
5 units (Bielefeldt) not given 1997-98

156. Goddesses, Women, and Power in India—Textual, ethnographic, and theoretical material. The variety of goddess traditions in the subcontinent; major texts, iconographies, and practices; who controls goddess temples and interprets tradition; the relations of goddess-related myths and practices to women’s lives and the construction of gender; the appropriation of Hindu goddesses by Euro-American women inspired by the availability of powerful female divine figures. Films and field trip to a Hindu temple dedicated to the Great Goddess.
4 units, not given 1997-98

170. Sex and Gender in East Asian Religions—How Asian religions (Buddhism and Taoism) dealt in theory and practice with the questions of sex and gender. The normative views found in each tradition; the models transmitted through mythology, ritual, and hagiography; the monastic definition of sexual norms and transgression, and of legitimate and illegitimate sexuality; the various conceptions of the body, and of desire, monastic discipline, and renunciation; the ritualization of sex and gender and the construction of a gendered religious experience through the Buddhist and Taoist discourses on embryology; and the role of women in such predominantly male traditions.
4 units (Faure) not given 1997-98

CHRISTIANITY
109. God and Gender: Christianity through the Eyes of Women—Introductory survey of contemporary feminist critiques and revisions of traditional Christian beliefs and practices. Recent contributions by Womanist, Mujerista, and Asian feminists. GER:3a,4c (DR:8†)
4 units, Aut (Pitkin)

126. Protestant Reformation—16th-century evangelical reformers (Luther, Calvin) and reform move-
132. Two Gospels: Matthew and Thomas—Questions about the early collection and uses of the teachings of Jesus through reading of one canonical and one non-canonical Gospel. Attention to the "Q" source of Jesus-sayings, and related topics.
5 units (Gregg) not given 1997-98

145. Protestantism: Ethics and Community—The structure and development of ethical thought in the Protestant theological tradition(s) from the Reformation to the 20th century. Readings in primary texts of representative authors: e.g., Luther, the Anabaptists, Spener, Edwards, Schleiermacher, Troeltsch, Barth, R. Niebuhr, Gustafson.
4 units (Sockness) not given 1997-98

4 units (Sockness) not given 1997-98

4 units (Gelber) not given 1997-98

168. Divine Justice in Medieval Thought and Literature—Medieval ethical beliefs through legends, myths, saints' lives, literature, and the ethical theories of Medieval scholars.
4 units (Gelber) not given 1997-98

172. Sex, Body, and Gender in Medieval Religion—Anxiety about sex and the body increased markedly during the early years of Christianity, while the doctrine of the Incarnation put the human body at the center of religious concern. Ideals of virginity, chastity, aesthetic self-denial of necessities like food, sleep, and freedom from pain were central to lay and clerical piety. The religious theory and practice associated with questions about sex, body, and gender in the Middle Ages as constructed in literature, mythology, ritual, mystic, and monastic texts. GER:3a,4c (DR:8t)
4 units, Spr (Gelber)

173. Religion in the Age of Reason—Western religious thought during the European Enlightenment (1650-1800). Figures and movements: the Deists, Locke, and Hume in England; the philosophers, Voltaire, and Rousseau in France; Pietism, Protestant Orthodoxy, Leibniz and Lessing in Germany.
4 units, Win (Sockness)

177. Religious Existentialism—Introduction to the influence of existentialism on religious thought since Kierkegaard.
5 units, not given 1997-98

181. Christian Theology and the Environmental Crisis—Examination of proposals by contemporary Christian thinkers for whom the environmental crisis forms an urgent challenge and necessary context for responsible thought about God, humanity, and the "natural" world. Topics: the "ecological complaint against Christianity;" models for conceiving the God-world relationship; the status of humanity within creation; anthropocentric vs. biocentric vs. theocentric ethics; scientific and religious accounts of cosmic origins and endings; ecofeminism.
4-5 units (Sockness) not given 1997-98

186. 20th-Century Christian Thought—Introduction to systematic theology in the 20th century through the study of the main proponents of "dialectical" or "Neo-Orthodox" theology: Karl Barth, Rudolf Bultmann, Reinhold Niebuhr, and Paul Tillich.
4 units, Aut (Sockness)

JUDAISM

112. Sexual Politics in the Ancient World—Study of biblical and classical texts that indicate sources of gender bias. Topics: construction of gender and social reality in ancient texts; the female divine in biblical religion; ways in which changing social attitudes, especially issues of gender and sexuality, challenge traditional values expressed in the Bible. Biblical stories of Sarah and Hagar, Ruth, Esther, Deborah, Judith; classical texts include Homer, Hesiod, Euripides' The Bacchae, Aristotle.
5 units (Bach) not given 1997-98

3 units (Gregg) not given 1997-98

5 units (Staff) not given 1997-98

128. Women and Judaism—The role and image of women in classical Judaism; responses of modern Jewish women to traditional conceptions of women and femininity. Recent attempts to create a feminist Judaism.
5 units, not given 1997-98

134. The Bible in Fiction; Fiction in the Bible—Use of biblical themes, tropes, and characters in modern fiction and films. Close readings of biblical
books *Genesis, Exodus, and 1 and 2 Samuel* in English. Jewish Midrashic writings Bialik and Pinski. Midrashic reading of novels *Joseph and His Brothers* (Mann); *East of Eden* (Steinbeck); *Moses, Man of the Mountain* (Hurston); *The Miracle Hater* (Hareven); *King David* (Heller); *Song of Solomon* (Morrison). Cultural readings of genre of "sword and sandal" films. Credit session for texts read in Hebrew. GER:3a (DR:7 or 8)

5 units (Eisen) not given 1997-98

161. Modern Jewish Thought—Key texts and thinkers in 20th-century Jewish thought that focus on God, the self, love, death, the quest for goodness and the meaning of Jewish existence. Thinkers include Buber, Heschel, Kook, Levinas, and Solveitchik.

5 units (Eisen) not given 1997-98

166. Myth and Ritual in Judaism—Festivals in the Jewish tradition.

5 units, not given 1997-98


5 units, not given 1997-98

184. Philosophers, Mystics, and Pietists in Jewish Culture—The perspectives of traditional Jews who have sought the spiritual significance and relevance of rabbinic law, and who have found it with the aid of allegory, symbol, and myth. Readings (in English translation) from philosophical, kabbalistic, and Hasidic primary sources composed between the 12th and 20th centuries. The antinomian potential of each of these traditions.

4 units, not given 1997-98

ISLAM

110. Islam in the Modern World—Critical and controversial issues in modern Islam. The beginnings of Islamic reforms in the 19th-century Middle East and the ideas of key modern thinkers. Some thematic issues such as the notion of an Islamic state, women's liberation and the move towards the Islamization of education. GER:3a (DR:8)

4 units, Aut (Moosa)

THEORETICAL AND COMPARATIVE STUDIES

113. Feminist Biblical Theologies—The tensions for women between feminism and faith. Developing a theology that includes women's concerns from traditional biblical theologies, conceptions of God, and traditional rituals and social practices that do not include women. Biblical texts and feminists, womanist, mujerista, Jewish, and traditional Christian interpretations. Small group meetings.

4 units (Bach) not given 1997-98


5 units (Bach) not given 1997-98

131. Feminist Literary Theories—(Same as Feminist Studies 102D.) For 1997-98, questions of race in fiction and film, especially whiteness as a category of race, raising questions around the strategies of domination and oppression. How are poser and authority mapped along racial lines? How does race operate as an organizing principle in the academy? In Jewish and Christian discourses? How do race and religion intersect in strategies or resistance? How is race mapped along lines of class, gender, and sexuality?

4 units, Aut (Bach)


4 units, Spr (Busto)

148. Social Theory and Religion

5 units (Eisen) not given 1997-98

149. Theories of Religion—The origin and persistence of religious behavior and belief in the modern period. Philosophical, sociological, historical, and psychological theories, "classic" and contemporary.

5 units, not given 1997-98

157. Readings in Greco-Roman Religion—Texts present philosophical and religious thought and point towards activities of discrete groups.

5 units (Gregg) not given 1997-98

163. Religion and Ethnicity—Religion and issues of race, class, and gender in the history and development of racially ethnic communities. Religion as promoting or resisting assimilation. Issues: revitalization, theories of liberation, dissent, and transformation within traditions.

5 units (Busto) not given 1997-98

165. Religious Ritual—Classical and contemporary theories of religious ritual with case studies from a variety of traditions.

5 units (Eisen, Faure) not given 1997-98

171. Faith and Politics in the Middle Ages—Medieval Christian, Islamic, and Jewish thought on the actual and ideal relation between church and state, religion and the political order. Philosophical,
theological, and political writings are considered in the context of historical developments and inter-religious polemic. 4 units, Spr (Lawee)

179. Religion in Science Fiction and Fantasy—What religion is to us can be discerned in the ways we imagine it to be. The place of religion in the modern literary imagination through science fiction texts and films. These are assessed in conjunction with theoretical texts that define religion in the academic imagination. Students construct a fictional religion or religious situation. 5 units, Win (Gelber)

UNDERGRADUATE DIRECTED READING

197. Senior Essay—Prerequisite: consent of instructor and of the department. Aut, Win, Spr (Staff)

199. Individual Work—Prerequisite: consent of instructor and of the department. Aut, Win, Spr (Staff)

UNDERGRADUATE SEMINARS

ASIAN RELIGIONS

204. Graduate Seminar: Problematizing the Japanese Landscape of Travel—(Same as Art 229D.) The cultural construction of landscape in medieval and premodern Japan. The representation of landscapes, seen and imagined, in painting, literature, religion, and social practice. Topics: religious visions and ritual fields (mandalas, sacred mountains), sites of cult and cult of sight (Fuji, Kumano), narratives of itinerary (travel diaries, illustrated hand scrolls), and topographic taxonomies (Meisho, Shinkelzu, guidebooks). 4 units, Au (Moerman, Takeuchi)

210. Speech and Writing in the Buddhist Traditions—Using Western “literature” on writing and morality (Derrida, Ong, Goody), examines various conceptions of speech and writing found in E. Asian religions, specifically the way writing has transformed the Chan/Zen tradition, and our interpretation of it. 4 units (Faure) not given 1997-98

211. Nivison and his Critics—(Same as Philosophy 211.) The philosophical work of David S. Nivison, reading his own works and those which influenced his approach, some recent criticisms, and his responses to these. 4 units (Ivanhoe) not given 1997-98

212. Interpreting Confucian Texts—(Same as Philosophy 212.) Illustrates the critical importance of historical and philosophical issues to the task of interpretation. Introduction to Chinese commentarial tradition. Seminar; pace and range determined by constituents. Prerequisite: consent of instructor. 5 units, Au (Ivanhoe)

221. Ch’an/Zen and Local Religion—The relationships between the Ch’an/Zen tradition and Chinese or Japanese local religion, focusing on forms of symbolic mediation (ritual, meditative techniques, etc.) in both religious traditions. Prerequisite: consent of instructor. 5 units (Faure) not given 1997-98

230A. Zen Buddhism Seminar—Selected topics in Ch’an and Zen; may be repeated for credit. 5 units (Bielefeldt) not given 1997-98

248. Xunzi Seminar—(Same as Philosophy 278.) Ethical and political philosophy of the early Confucian philosopher Xunzi. Prerequisite: consent of instructor. 4-5 units (Ivanhoe) not given 1997-98

249. Japanese Buddhism Seminar—Selected topics in Japanese Buddhism. May be repeated for credit. 4 units (Bielefeldt) not given 1997-98

250. Japanese Buddhist Texts—Readings in medieval Japanese Buddhist materials. Prerequisite: background in Japanese and/or Chinese. 5 units, Spr (Bielefeldt)

CHRISTIANITY

234. The Virgin Mary and Images of Power—Studies through art and literature the emergence of the Virgin Mary as a symbol of religious and cultural values from earliest legends to the modern era. Emphasis is on the Middle Ages. 5 units, Spr (Gelber)

240. Jews, Pagans, and Christians in Late Antiquity—Investigation of the distinctive expressions of Judaism, Roman polytheism, and Christianity from 100-450, emphasizing interactions between the groups. Primary documents and new studies of late Roman religious-political competition and conflict. 4 units (Gregg) not given 1997-98

241. Asceticism in Pagan and Christian Antiquity 4 units (Gregg) not given 1997-98

242. Wrestling with the Text: Perspectives on the Bible in the Age of Reform, 1400-1600—Significant and often conflicting developments in the interpretation and use of the Bible by renaissance humanists, Roman Catholics, and protestants from the late medieval period through 1570. Issues of translation, the canon, and the authority of sacred texts. 4 units, Win (Pitkin)

268. Model Selves: Francis of Assisi—Formation of the model self in myth and history in the Western tradition, emphasizing Francis of Assisi, with reference to other model selves, masculine and feminine. 5 units (Gelber) not given 1997-98

271. Dante and Aquinas 4 units, Spr (Yearley)

273. Aquinas' Ethics—Thomas Aquinas' general theory of human flourishing and his analysis of
specific human excellences (e.g., love, courage, and magnanimity) and human deformations (e.g., vanity, pride, and envy). Limited enrollment.

5 units (Yearley) not given 1997-98

274. From Kant to Kierkegaard—The main currents of theology and religion in Germany, emphasizing themes of the knowledge of God and the problem of alienation.

5 units, not given 1997-98


5 units, not given 1997-98


5 units, not given 1997-98

280. Schleiermacher—The “father of modern theology,” Friedrich Schleiermacher (1768-1834) holds a monumental place in the history of Western religious thought since the Enlightenment. Exploration of his controversial reconception of the theological enterprise through a study of his most significant religious writings.

4 units (Sockness) not given 1997-98

JUDAISM

213. Myth in the Ancient Near East—Myth as genre; the connection between mythologies and religious systems. Myths of Sumer, Babylon, Egypt, Canaan, and Greece (Gilgamesh, Enuma elish, Baal and Anath, Hesiod’s Theogony) compared with Israel’s myths of creation, flood, divine realm. Myth in contemporary culture and social institutions.

5 units (Bach) not given 1997-98

214. The Book of Genesis and Beyond—Literary-critical investigation of the patterns and topics in the book of Genesis, including creation, motherhood, covenant, brothers. Postbiblical texts such as Jubilees, Genesis, Rabbah, and other expansions of Genesis narratives are studied as examples of early reader-response criticism of the Bible. Prerequisite: 15 or consent of instructor.

5 units (Bach) not given 1997-98

226. Back to the Sources: Close Readings of Classical Jewish Texts—Examination of selected rabbinic, mystical, philosophical and exegetical texts. Sources are read in translation and in Hebrew.

4 units, Win (Lawee)


4 units (Gregg) not given 1997-98

260. Contemporary Jewish Thought: Jewish Feminism and Jewish Tradition—Jewish women’s relationship to Jewish tradition, and the theology and religious practices of contemporary Jewish feminism. Topics: gender in traditional Jewish society; traditional women’s spirituality, rituals, and liturgy; gender and Jewish modernity; the feminist critique of Jewish tradition and the creation of alternative traditions; the “feminization of Judaism.”

5 units, not given 1997-98

264. Hasidism and Modernity—Hasidism, a Jewish pietist movement in late 18th-century Eastern Europe, can be viewed as a blend of the traditional and the modern. Primary sources and secondary literature show this polarity in historiographies and representations of Hasidisms, the zaddic as an alternative type of Jewish leader, the roles of textual and non-textual authority in Hasidic culture, Hasidism’s relationship to kabbalah and Sabbateanism.

4 units, not given 1997-98

281. Encounters between Modern Philosophy and Judaism

5 units (Eisen) not given 1997-98

THEORETICAL AND COMPARATIVE STUDIES

208. Feminist Theology—Seminar examining contemporary feminist critiques, rejections, and revisions of traditional Western, principally Christian, beliefs and practices.

4 units (Pitkin) not given 1997-98


5 units (Faure) not given 1997-98

225. Syncretism and Revitalization Movements—Reading and reevaluating “classic” models of religious change. Case studies in religious change under conquest, colonialism, and crisis.

4 units (Busto) not given 1997-98

227. Religion and Gender

5 units (Bach) not given 1997-98


4 units (Gregg) not given 1997-98

245. Comparative Religious Ethics

5 units, Win (Yearley)

247. American Religious Ethics—Is there a distinctive American approach to the relation of ethics and religion? Representative texts of American Puritans, Transcendentalists, Pragmatists, and Natu-
251. Approaches to Native American Traditions—Native American traditions have been studied from a variety of disciplines and assumptions. Seminar critiques the ways scholars (Indian and non-Indian) have advanced our understanding of Native American world views.

5 units (Busto) not given 1997-98


5 units (Busto) not given 1997-98


4 units (Busto) not given 1997-98

261. Modernization/Secularization—Reexamination of these two fundamental concepts in light of recent historical, sociological, anthropological, and philosophical developments.

5 units (Eisen) not given 1997-98

270. Science and Religion—From Galileo and Newton to Einstein, religion and science have been deeply intertwined, yet science now challenges traditional religious belief. The questions science raises through the reading of historical texts and modern debates.

5 units (Gelber) not given 1997-98

272. Skepticism and Morality—Meta-ethics. What is the nature and justification of moral truth claims?

5 units (Staff) not given 1997-98

276. Topics in Race and Religion—Seminar on issues in the intersection of race and religion.

4 units (Busto) not given 1997-98

286. Character and the Good Life—Is it possible or desirable to revive classical notions of good character and the good life? Are such ideals irrelevant to modern pluralistic societies? These questions are pursued in modern works that analyze the issues and classical definitions, Western and Chinese, of human excellence. Limited enrollment.

5 units (Yearley) not given 1997-98

290. Majors Seminar—Required for Religious Studies majors and suggested for joint RS/Philosophy majors to discuss critical issues in the study of religion, and to work on senior essays in progress.

Topic for 1998: God (the God of the Bible) and the gods of the ancient Mediterranean world. (WIM) 4 units, Win (Bach)

GRADUATE DIRECTED READING

299. Individual Work—Prerequisite: consent of instructor.

Aut, Win, Spr (Staff)

GRADUATE SEMINARS, RESEARCH, AND TEACHING

Topics of directed research (numbers ending in 9) vary each year according to student initiative and faculty research interests.

304A. Theories and Methods in the Study of Religion—Required of all graduate students in Religious Studies. Various approaches to the study of religion. Prerequisite: consent of instructor.

4 units, Aut (Yearley)

304B. Theories and Methods in the Study of Religion—(See 304A.) Required of all graduate students in Religious Studies. Various approaches to the study of religion. Prerequisite: consent of instructor.

4 units, not given 1997-98

310. Buddhist Studies Proseminar

5 units, Win (Bielefeldt)

311. Buddhist Studies Seminar

5 units (Faure) not given 1997-98

314. Advanced Classical Chinese Texts—(Same as Philosophy 314.)

4 units (Ivanhoe) not given 1997-98

315. Ch'an Studies: Methodological Issues—Relevance of recent developments in "theory" (hermeneutics, structuralism, post-structuralism, critical theory) for the study of the Ch'an and Zen tradition. Readings from Foucault, Derrida, Ricoeur, Bourdieu, and Ch'an/Zen classics. Prerequisite: consent of instructor.

4 units (Faure) not given 1997-98

319. East Asian Religions—Directed research.

(Bielefeldt, Faure, Ivanhoe, Yearley)

321. Graduate Seminar in Modern Judaism—Prerequisite: consent of instructor.

4 units, Spr (Eisen)

323. Medieval Jewish Biblical Exegesis—Historical and literary approaches to the tradition of scriptural commentary and its bearing on issues on faith and reason, the authority of the past, and interreligious dialogue and disputations.

4 units, Aut (Lawee)


(Bach, Eisen, Gregg)

332. Essays and Letters of Zhuang Xuechang—(Same as Philosophy 332.)

4 units, Win (Ivanhoe)
339. Medieval Western Religions—Directed research.  
   (Gelber, Yearley)

369. Religion and Literature—Directed research.  
   (Bach)

370. Graduate Seminar in Religious Ethics— 
   Topics and authors in Western religious traditions, 
   concentrating on those in the Christian tradition. 
   Topics in comparative religious ethics, especially 
   those involving E. Asia and the West. Prerequisite: 
   consent of instructor. 
   4 units (Yearley) not given 1997-98

373. Historicism and its Problems—The emer- 
   gence, varieties, and crises of historicism as a world 
   view and approach to the study of religion in the 
   19th and 20th centuries. The implications of histor- 
   ical reason and historical consciousness for the 
   philosophy of religion, ethics, and Christian theol- 
   ogy. "New historicism" in contemporary religious 
   studies (e.g., Stout, MacIntyre). 
   4 units, Win (Sockness)

379. Religious Thought—Directed research.  
   (Bielefeldt, Eisen, Gelber, Harvey, Yearley)

   (Eisen, Faure, Harvey, Yearley)

390. Teaching in Religious Studies—Required 
   supervised internship. 
   4 units, Aut, Win, Spr (Staff)

392. Candidacy Essay—Prerequisite: consent of 
   graduate director. 
   variable units, Aut, Win, Spr (Staff)

395. Master of Arts Thesis 
   2-9 units (Staff)

CENTER FOR RUSSIAN AND EAST EUROPEAN STUDIES

Emeriti: Alexander Dallin, Joseph N. Frank, Alex 
Inkeles, Jan F. Triska, Joseph Van Campen, 
Henry Rowen, Wayne S. Vucinich
Committee in Charge: The Steering Committee 
on Russian and East European Studies
Director: Nancy S. Kollmann (History; Moscow, 
Autumn)
Acting Director: Richard Schupbach (Slavic Lan-
guages, Autumn)
Assistant Director: Irina Barnes
Academic Coordinator: Jack Kollmann
Professors: Karol Berger (Music), Terence L. 
Emmons (History, on leave Autumn), Lazar 
Fleishman (Slavic Languages), Gregory Freidin 
(Slavic Languages, on leave), David J. 
Holloway (History, Political Science), Nancy 
S. Kollmann (History; Moscow, Autumn), 
Mark Mancall (History), Norman Naimark 
(History), Condoleezza Rice (Political Sci-
ence), Aron Rodrigue (History), Richard D. 
Schupbach (Slavic Languages), Nancy B. Tuma 
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Assistant Professors: Michael McFaul (Political Science), 
Stephen Moeller-Sally (Slavic Languages), Amir Weiner (History)
Courtesy Professor: Ga\l\l\l Lapidus (Political Science)

Courtesy Associate Professor: Coit Blacker (Political Science)

Lecturers: Rima Greenhill (Slavic Languages), 
Laurie Koloski (History), Serafima Radivilova 
(Slavic Languages), Nikolai Ssorin-Chaikov 
(Anthropology)

Acting Assistant Professor: Andrey Arkhipov 
(Slavic Languages)

Visiting Faculty: Evgeny Dobrenko (Slavic Languages), John Earle (Economics)

Affiliates: Michael Bernstam (Hoover Institution), 
Robert Conquest (Hoover Institution), John B. 
Dunlop (Hoover Institution), Joseph D. Dwyer 
(Hoover Institution), Geoffrey Rothwell (Economics)

The Center for Russian and East European Studies (CREES) coordinates the University's 
teaching, research, and extracurricular activities 
related to the area of the former Soviet Union and 
Eastern Europe, and administers two interdisci-

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1. Those who intend to apply to a Ph.D. program 
involving Russian and East European studies 
   and who need to enhance their academic skills 
   and credentials.

2. Those who intend to pursue advanced degrees 
   and/or careers in such fields as government, 
   journalism, business, law, or education, and 
   who wish to establish a corollary competence 
in Russian and East European studies.
3. Those who are as yet undecided on a career but who wish to continue an interest in Russian and East European studies.

Each A.M. candidate works with the CREES academic coordinator who advises on a program of course work, monitors the student's progress toward completing the degree, and assists the student in planning for postgraduate employment or further education. In addition, each A.M. candidate is encouraged to consult with CREES-affiliated faculty members concerning academic and career plans.

**UNDERGRADUATE PROGRAMS**

**MINORS**

The minor in Russian and East European Studies (REES) is an interdisciplinary area studies program that allows the participating student significant opportunity to select REES courses in various departments according to his or her interests.

**REQUIREMENTS**

1. Two core courses: one on Russia/Soviet Union, one on Eastern Europe, to be selected by the student from an annual list of qualifying courses issued by CREES.
2. At least four additional REES courses, totaling at least 20 units.
3. The student's courses, core and additional, must be distributed among at least three departments; that is, the student takes at least one course in each of three departments. In addition to REES courses in the departments of History, Political Science, and Slavic Languages and Literatures, REES courses in Anthropology, Economics, Sociology, and so on, when offered, may qualify. The CREES academic coordinator determines which courses qualify for the minor.
4. A "capstone" experience in REES, including, but not limited to, one of the following:
   a) A departmental seminar course for advanced undergraduates
   b) Directed reading and research with a Stanford faculty member or a CREES-approved resident or visiting scholar
   c) Participation in the Stanford Moscow Overseas Studies campus

**Foreign Language**—The REES minor has no language requirement, but the participating student is strongly encouraged to attain working competence in Russian or another relevant language. Courses at the third-year level or above in Russian or another language of the former Soviet Union or Eastern Europe (excluding German) count towards the REES minor, up to a maximum of 9 units.

**Additional Information**—The total number of courses applied to the REES minor must be at least six, but the minor should total no more than 36 units. Courses counting towards the REES minor may not be counted towards the student's major. Courses taken at Stanford overseas campuses (particularly the Moscow campus) may count towards the REES minor, with prior approval; at least three courses for the minor must be taken in residence at Stanford.

**Approval of CREES Academic Coordinator**—Students pursuing the REES minor work with the CREES academic coordinator, who is responsible for determining that requirements for the minor are satisfied. Questions about which courses count towards the minor, which courses taken overseas count towards the minor, what project counts as a "capstone" experience, and so on, are also handled by the academic coordinator.

**CORE COURSES**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
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<tbody>
<tr>
<td>Eastern Europe:</td>
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<tr>
<td>Hist. 119A. Aristocracies and Absolutism, Early Modern Eastern Europe, 1400-1800</td>
<td>5</td>
</tr>
<tr>
<td>Hist. 125. Russia/Soviet Union: 20th-Century Eastern Europe</td>
<td>5</td>
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<tr>
<td>Hist. 120C. History of the Soviet Union</td>
<td>5</td>
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<tr>
<td>Pol. Sci. 121M. Russian Politics</td>
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<tr>
<td>Slavic Lang. &amp; Lit. 146. Violence and the Sacred in the Russian Novel</td>
<td>4</td>
</tr>
<tr>
<td>Slavic Lang. &amp; Lit. 147. Russian Literature and Culture in the 20th Century</td>
<td>4</td>
</tr>
</tbody>
</table>

**ADMINISTRATION AND CERTIFICATION**

Students interested in pursuing the REES minor should consult the CREES academic coordinator, and then complete the Minor Declaration Form. Students declaring the REES minor must do so no later than five quarters prior to their intended quarter of degree conferral. Approval of minor declarations, and certification of requirements are made by the CREES academic coordinator.

**COTERMINAL A.B./A.M.**

To qualify for a coterminal A.M. degree in Russian and East European Studies, a student must, besides completing University requirements for the A.B. degree:

1. Submit a coterminal application for admission to the program no earlier than the beginning of the eighth quarter, and no later than the end of the 11th quarter of undergraduate study. Students with advanced placement and transfer credit must apply at least four quarters before the expected master's degree conferral date. Applications may be obtained from Degree Progress, the Registrar's Office. The annual deadline for all applications to the A.M. pro-
gram in Russian and East European Studies is
January 1. The Admissions Committee considers
coterminal applications at the same time that it
reviews applications from outside Stanford
and from other graduate degree programs within
the University.

2. Include in the application a program which
outlines, by quarter, the schedule of courses the
student plans to complete toward the A.M.
degree. The student should seek the advice of
the CREES academic coordinator in drafting
this schedule. The application also should in-
clude: (a) a current Stanford transcript, (b) a
one-page statement of purpose, and (c) two
letters of recommendation from Stanford pro-
fessors. Applicants must have a grade point
average (GPA) of at least 'B' (3.0). Cotermi-
nal applicants must take the General Test of the
Graduate Record Examination and have the
results sent to Graduate Admissions, the Reg-
istrar's Office.

3. Complete 15 full-time quarters or the equiva-
ient, or three quarters in full-time residence after
completing 180 units; and complete, in addi-
tion to the 180 units required for the bachelor's
degree, a minimum of 40 units for the master's
degree.

The same courses may not be counted to meet
both undergraduate and graduate requirements,
and no courses taken before the junior year may
be used to meet the course requirements for the
master's degree. Requirements for completion of
the A.M. degree are summarized below; a more
detailed description of the program and require-
ments is available from the center.

SLAVIC THEME HOUSE

Slavianskii Dom, at 650 Mayfield Avenue, is
an undergraduate residence which houses 50 stu-
dents and offers them a wide variety of opportu-
nities to expand their knowledge, understanding,
and appreciation of Russia and Eastern Europe.
A member of the Department of Slavic Languages
and Literatures serves as resident fellow.

OVERSEAS
STUDIES PROGRAMS

Undergraduate students interested in the study
of the languages, history, culture, and social or-
ganization of Russia and Eastern Europe can apply
to study at Stanford centers in Berlin and Moscow.
For information about these programs, contact the
Overseas Studies office in Sweet Hall.

GRADUATE PROGRAMS
MASTER OF ARTS

ADMISSION

CREES offers an interdisciplinary master's
degree in Russian and East European Studies
(REES). An application packet may be obtained
directly from Graduate Admissions, Registrar's
Office, Stanford University, Stanford, CA 94305-
3052. In addition, prospective applicants are
strongly encouraged to consult with the academic
coordinator at CREES regarding the application
process.

The materials in the application packet provide
detailed instructions for applying. To qualify for
admission to the program, the following apply:
1. Applicants must have earned an A.B. or B.S.
degree or the equivalent.
2. Applicants must have completed at least three
years of college-level Russian language study
or the equivalent prior to beginning the pro-
gram. Other languages of Eastern Europe or the
former Soviet Union may be accepted on a case-
by-case basis.
3. Applicants whose native language is not En-
lish are ordinarily expected to take the Test
of English as a Foreign Language (TOEFL) and
have the results sent to Graduate Admissions, the Reg-
istrar's Office.
4. All applicants must take the general test of the
Graduate Record Examination and have the
results sent to Graduate Admissions, the Regi-
strar's Office.

The deadline for submission of applications for
admission and for financial aid is January 1. Ad-
mission is normally granted for Autumn Quarter,
but requests for exceptions are considered.

The successful applicant generally demon-
strates the following strengths: adequate foreign
language study, course work in Russian and East
European studies in various disciplines, outstand-
ing grades in previous academic work, high GRE
scores (particularly verbal and analytical), strong
letters of recommendation, and a persuasive state-
ment of purpose explaining why and how the
program fits the applicant's academic and career
goals.

DEGREE REQUIREMENTS

Candidates for the A.M. degree must meet
University requirements for an A.M. degree as
described in the "Graduate Degrees" section of
this bulletin.

The A.M. program in REES can ordinarily be
completed in one academic year by a well-prepared
student; longer periods of study are permitted.
Requirements to complete the interdisciplinary
A.M. degree are principally ones of distribution,
with the exception of three required core cours-
es, as described below. Each student, with the
advice of the CREES academic coordinator, se-
lects courses according to the student's interests,
needs, and goals.

All students in the A.M. REES program must
complete a minimum of 40 academic credit units
within the following guidelines.
1. Language study: students in the program must study Russian or another language of the former Soviet Union or Eastern Europe. Credit towards the 40-unit minimum (up to a total of 9 units) is allowed for advanced language work; in the case of Russian, "advanced" is defined as third-year Russian language instruction and above. Similar standards apply for other languages.

2. Interdisciplinary course work: a minimum of five graduate courses in Russian and East European studies must be completed and distributed among at least three departments. All course work applied to the 40-unit minimum must deal primarily with Russian/Soviet/post-Soviet or East European studies.

3. Core Courses: a required core course is designated each academic quarter; students must complete three quarters of core courses.

4. All course work qualifying for the 40-unit minimum must have a grade point average (GPA) of 'B' or higher. ('B-' does not count for degree credit.)

5. Students are expected to complete introductory course work in Russian and East European studies in the disciplines of history, literature, and politics. Courses taken prior to graduate work at Stanford are considered on a case-by-case basis towards satisfying this requirement.

6. Students are expected to do course work in both Russian/Soviet/post-Soviet studies and in East European studies. Course work completed prior to graduate work at Stanford is considered in determining whether this requirement has been satisfied.

7. All courses counting towards the 40-unit minimum must be approved by the CREES academic coordinator, who ensures that planned course work satisfies requirements towards the degree. The CREES faculty director and steering committee determine the specific requirements.

A more detailed description of the A.M. program is sent to all applicants and is available by request from the Center for Russian and East European Studies.

**CORE COURSES**

CREES designates one core course each academic quarter as required of all A.M. students from among departmental offerings, typically in History, Political Science, or Slavic Languages and Literatures. Courses selected as core courses examine subject areas of fundamental importance within modern Russian, Soviet, post-Soviet, and East European studies, and address questions of research, methodology, and current scholarship. Courses so designated for 1997-98 are:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hist. 321C. Graduate Colloquium: Historiography of the Soviet Union</td>
<td>A 5</td>
</tr>
<tr>
<td>Pol. Sci. 218L. Ethnicity and Nationalism in Soviet and Post-Soviet Politics</td>
<td>W 5</td>
</tr>
</tbody>
</table>

**FINANCIAL AID**

Subject to funding, CREES may have a limited amount of financial aid to offer in the form of Foreign Language and Area Studies (FLAS) fellowships. Recipients of FLAS fellowships must be American citizens or permanent residents and must enroll in Russian language courses at Stanford at the appropriate level. Applicants in the A.M. program have priority in the annual FLAS competition; in recent years CREES has also awarded FLAS fellowships in the Graduate School of Business and the School of Law. Consult the CREES academic coordinator for further information about the application and award process. Applications for FLAS fellowships are available from the Center for Russian and East European Studies.

**CONCURRENT DEGREE PROGRAMS**

The Center for Russian and East European Studies collaborates with the Schools of Business and Law to allow students to simultaneously pursue concurrent degrees in Russian and East European Studies (A.M.) and the respective professional field (J.D., M.B.A.). Students must apply to and be independently admitted to each degree program. For additional information about specific plans of study and degree requirements, contact the Center for Russian and East European Studies.

**DOCTORAL PROGRAMS**

Since the University does not offer a Ph.D. in Russian and East European Studies, students wishing to pursue a REES-related doctoral program must apply to one of the departments offering a Ph.D. with an emphasis on Russia, the former Soviet Union, or Eastern Europe such as the departments of History, Political Science, or Slavic Languages and Literatures.

**COURSES**

200. Directed Individual Study—For students engaged in special interdisciplinary work that cannot be arranged by a department.

1-5 units, Aut, Win, Spr (Staff)

**AFFILIATED DEPARTMENT OFFERINGS**

The courses listed below by department deal primarily with Russia, the Soviet Union, or Eastern Europe. See the respective department listings for course descriptions. Additional relevant courses by resident or visiting faculty may be offered; for updated information, consult the quarterly *Time Schedule* or contact the Center for Russian and East
European Studies. Students in the area studies A.M. program must have their course list approved by the department prior to enrollment.

ANTHROPOLOGY
163A. Ethnic and National Identities
5 units, Win (Ssorin-Chaikov)
224. Eastern European Social Thought
5 units, Spr (Ssorin-Chaikov)

ECONOMICS
126. Comparative Economic Institutions: The Economics of Transition
5 units, Spr (Qian)
293. Reform and Transition in Socialist Economies
5 units, Spr (Qian)

HISTORY
18S. Sources and Methods Seminar: Stories about Communism-Eastern Europe since 1945
5 units, Win (Koloski)
22N. Stanford Introductory Seminar: Ethnic Cleansing in 20th-Century Europe
5 units, Win (Naimark)
119. Aristocracies and Absolutism: Early Modern Eastern Europe, 1400-1800
5 units, Spr (Kollmann)
120B. Imperial Russia, 1762-1917
5 units, Win (Emmons)
120C. 20th-Century Russian and Soviet History
5 units, Aut (Weiner)
125. 20th-Century Eastern Europe
5 units, Aut (Naimark, Koloski)
137. The Holocaust
5 units, Aut (Rodrigue)
219S/419. Undergraduate/Graduate Research Seminar: The Soviet Civilization
4-5 units, Spr (Weiner)
221A. Undergraduate Colloquium: “Christ of Nations?”—The Dilemmas of Modern Poland
5 units, Spr (Koloski)
221C/321C. Undergraduate/Graduate Colloquium: Historiography of the Soviet Union
4-5 units, Aut (Weiner)
223/323. Undergraduate/Graduate Colloquium: Honor, the Law, and Modernity in Early Modern Europe and Russia
4-5 units, Win (N. Kollmann)
226/326. Undergraduate/Graduate Colloquium: Modernity, Revolution, and Totalitarianism
4-5 units, Win (Weiner)
300W. Graduate Directed Reading
units by arrangement (Staff)

306B. Design and Methodology for International Field Research
1 unit, Win (Duus, Kollmann, R. Roberts)
321A. Graduate Colloquium: Topics in Early Modern Russian Historiography
4-5 units, Win (Kollmann)
321B. Graduate Colloquium: Topics in Modern Russian Historiography
4-5 units, Spr (Emmons)
433. Graduate Seminar: Modern Eastern Europe
4-5 units, Spr (Naimark)

OVERSEAS STUDIES PROGRAM
MOSCOW
15. Academic Internship
5 units, Aut, Win (Bratersky)
16. Tutorial
3-5 units, Aut, Win (Bratersky)
21. Ethnic Moscow
3 units, Aut (Abashkin)
22. Russian Culture in the 90s
2 units, Aut (Staff)
24. The Architecture and Art of Moscow: A Walking Tour
units by arrangement, Aut (J. Kollmann, N. Kollmann)
112X. Environmental Biology of Russia
5 units, Aut (Yampolsky)
113W. Sociology and Social Psychology of Modern Russian Society
5 units, Aut (Titma)
119X. Russian Politics
5 units, Aut (Bratersky)
121V. Russia in the Age of Nobility 1700-1840: State, Society, and Culture
5 units, Aut (Zorin)
146X. Contemporary Issues of Russian Society
4 units, Win (Bratersky)

RUSSIAN LANGUAGE PROGRAM
10M. Intensive First-Year Russian
10 units, Aut (Boldyreva)
51M. Second-Year Russian I
6 units, Aut (Kuznetsova)
53M. Second-Year Russian II
6 units, Win (Kuznetsova)
111M. Third-Year Russian I
6 units, Aut (Shimanskaya)
113M. Third-Year Russian II
6 units, Win (Shimanskaya)
177M. Fourth-Year Russian I
6 units, Aut (Kurbanova)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Terms</th>
<th>Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>179M</td>
<td>Fourth-Year Russian II</td>
<td>6</td>
<td>Win</td>
<td>Kurganova</td>
</tr>
<tr>
<td>POLITICAL SCIENCE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>119M</td>
<td>Seminar: Revolutions</td>
<td>5</td>
<td>Spr</td>
<td>McFaul</td>
</tr>
<tr>
<td>120D/220D</td>
<td>Seminar: The Foreign Policies of the Post-Soviet States</td>
<td>5</td>
<td>Aut</td>
<td>Dallin</td>
</tr>
<tr>
<td>121M</td>
<td>Russian Politics</td>
<td>5</td>
<td>Win</td>
<td>McFaul</td>
</tr>
<tr>
<td>127</td>
<td>Evaluating East European Transitions</td>
<td>5</td>
<td>Spr</td>
<td>Staff</td>
</tr>
<tr>
<td>218L</td>
<td>Ethnicity and Nationalism in Soviet and Post-Soviet Politics</td>
<td>5</td>
<td>Win</td>
<td>Lapidus</td>
</tr>
<tr>
<td>223M</td>
<td>Seminar: Political Economy of Post-Communism</td>
<td>5</td>
<td>Spr</td>
<td>McFaul</td>
</tr>
<tr>
<td>245R</td>
<td>Seminar: The Transformation of Europe</td>
<td>5</td>
<td>Win</td>
<td>Rice</td>
</tr>
<tr>
<td>SLAVIC LANGUAGES AND LITERATURES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12N</td>
<td>Stanford Introductory Seminar: Studies in Russian—Prince Igor and Boris Godunov</td>
<td>3</td>
<td>Win</td>
<td>Fleishman</td>
</tr>
<tr>
<td>13N</td>
<td>Stanford Introductory Seminar: Russia, Russian, Russians</td>
<td>3</td>
<td>Spr</td>
<td>Schupbach, Freidin</td>
</tr>
<tr>
<td>45/145/245</td>
<td>The Age of Experiment (1820-1864)</td>
<td>4</td>
<td>Aut</td>
<td>Greenleaf</td>
</tr>
<tr>
<td>46/146/246</td>
<td>Violence and the Sacred in the Russian Novel: War and Peace, The Brothers Karamozov</td>
<td>4</td>
<td>Win</td>
<td>Moeller-Sally</td>
</tr>
<tr>
<td>47A/147A/247A</td>
<td>Russian Literature and Culture in the 20th Century</td>
<td>3-4</td>
<td>Spr</td>
<td>Fleishman</td>
</tr>
<tr>
<td>47B/147B/247B</td>
<td>Soviet Cinema</td>
<td>2</td>
<td>Spr</td>
<td>Fleishman</td>
</tr>
<tr>
<td>65Q</td>
<td>Stanford Introductory Seminar: Art and Revolution in Russia</td>
<td>3</td>
<td>Aut</td>
<td>Fleishman</td>
</tr>
<tr>
<td>66Q</td>
<td>Stanford Introductory Seminar: Madness and Byzantine Civilization</td>
<td>4</td>
<td>Aut</td>
<td>Arkhipov</td>
</tr>
<tr>
<td>110</td>
<td>Russian &quot;Crash&quot; Course</td>
<td>1</td>
<td>Spr</td>
<td>Schupbach</td>
</tr>
<tr>
<td>148/248</td>
<td>Totalitarian Cinema</td>
<td>3</td>
<td>Aut</td>
<td>Dobrenko</td>
</tr>
<tr>
<td>151</td>
<td>Dostoevsky</td>
<td>4</td>
<td>Aut</td>
<td>Frank</td>
</tr>
<tr>
<td>157</td>
<td>Being and Time in the Novels of Milan Kundera</td>
<td>5</td>
<td>Aut</td>
<td>Moeller-Sally</td>
</tr>
<tr>
<td>161/261</td>
<td>Poetess: The Grammar of the Self when the Poetess is a Woman</td>
<td>4</td>
<td>Win</td>
<td>Fleishman</td>
</tr>
<tr>
<td>UNDERGRADUATE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,2,3</td>
<td>First-Year Russian</td>
<td>3-5</td>
<td></td>
<td>Radivilova, Staff</td>
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<tr>
<td>50</td>
<td>Review of Russian Grammar: Repair Russian</td>
<td>3</td>
<td>Aut</td>
<td>Schupbach</td>
</tr>
<tr>
<td>51,52,53</td>
<td>Second-Year Russian</td>
<td>5</td>
<td>Aut, Win, Spr</td>
<td>Greenhill</td>
</tr>
<tr>
<td>52B</td>
<td>Second-Year Russian</td>
<td>5</td>
<td>Win</td>
<td>Schupbach, Greenhill</td>
</tr>
<tr>
<td>111,112,113</td>
<td>Third-Year Russian</td>
<td>4</td>
<td>Aut, Win, Spr</td>
<td>Schupbach, Greenhill</td>
</tr>
<tr>
<td>115</td>
<td>Humor and Russian Literature</td>
<td>2-4</td>
<td>Spr</td>
<td>Schupbach, Greenhill</td>
</tr>
<tr>
<td>117A,B,C</td>
<td>Russian for Native Speakers</td>
<td>1-3</td>
<td>Aut</td>
<td>Schupbach, Greenhill</td>
</tr>
<tr>
<td>118A</td>
<td>Business Russian for Beginners</td>
<td>1-3</td>
<td>Aut</td>
<td>Greenhill</td>
</tr>
<tr>
<td>129/229</td>
<td>Poetry as System: Introduction to Theory and Practice of Russian Verse</td>
<td>4</td>
<td>Win</td>
<td>Fleishman</td>
</tr>
<tr>
<td>ADVANCED UNDERGRADUATE AND GRADUATE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>177,178,179</td>
<td>Fourth-Year Russian</td>
<td>3</td>
<td>Win, Spr</td>
<td>Arkhipov, Grenleaf</td>
</tr>
<tr>
<td>181,182,183</td>
<td>Fifth-Year Russian</td>
<td>3</td>
<td>Aut</td>
<td>Fleishman</td>
</tr>
<tr>
<td>187</td>
<td>Russian Poetry of the 18th and 19th Centuries—(Same as 181.)</td>
<td>4</td>
<td>Aut</td>
<td>Fleishman</td>
</tr>
<tr>
<td>188</td>
<td>From Alexander Blok to Joseph Brodsky: Russian Poetry of the 20th Century</td>
<td>4</td>
<td>Spr</td>
<td>Fleishman</td>
</tr>
<tr>
<td>193</td>
<td>The Orthodox World</td>
<td>3</td>
<td>Spr</td>
<td>Arkhipov, Kollman</td>
</tr>
<tr>
<td>198D,E,F</td>
<td>Slavic Languages through Russian: Bulgarian, Czech, and Serbo-Croatian</td>
<td>1-3</td>
<td>Aut, Win, Spr</td>
<td>Arkhipov</td>
</tr>
</tbody>
</table>

CENTER FOR RUSSIAN AND EAST EUROPEAN STUDIES 707
199. Individual Work
1-5 units, any quarter (Staff)

200. Proseminar in Literary Theory and Study of Russian Literature
4 units, Aut (Moeller-Sally)

200A. Slavic Bibliography
3 units, Win (Zalewski)

211. Introduction to Old Church Slavic
4 units, Aut (Arkhipov)

212. Old Russian and Old Church Slavic
4 units, Win (Arkhipov)

213. History of the Russian Literary Language
4 units, Spr (Fleishman)

299. Individual Work
1-12 units, any quarter (Staff)

300A. Graduate Seminar: Studies in the Sociology of Literature and Culture (Imperial and Soviet Russia)
4 units, Aut (Moeller-Sally)

399A. Advanced Research Seminar in Russian Literature
2-4 units, Aut, Win, Spr (Staff)

SOCIOLOGY

116/216. Comparative Sociology: Successor States of Soviet Union
5 units, Win (Titma)

SCIENCE, MATHEMATICS, AND ENGINEERING CORE

Program Director: Brad Osgood
Track Chairs: Mark Zoback, David Botstein, Brad Osgood
Core Faculty: Martin Blunt (Petroleum Engineering), David Botstein (Genetics), Patricia Burchat (Physics), David Cox (Genetics), Russell Fernald (Psychology, Human Biology), Jerry Harris (Geophysics), Sharon Long (Biological Sciences), Michael McWilliams (Geophysics), Richard Myers (Genetics), Brad Osgood (Mathematics), R. Fabian Pease (Electrical Engineering), David Siegmund (Statistics), Robert Simoni (Biological Sciences), Virginia Walbot (Biological Sciences), Ward Watt (Biological Sciences), Mark Zoback (Geophysics)

The courses in the Science, Mathematics, and Engineering (SME) core provide the opportunity for students to have a serious encounter with essential ideas of science, mathematics, and engineering, with an emphasis on process. This program is especially designed for students whose primary interests are in the humanities and social sciences.

Each track in the program is team taught by faculty from across the University. All of the tracks address common concepts, but from different points of view. Examples of the areas that are part of the general framework of science include: science as a structure of testable hypotheses; the nature of energy in the physical world; the character of physical law based on quantitative, reproducible evidence; the molecular basis for living and non-living things; the interplay between the physical world and biological systems; scaling, emergence, and the idea of going from elementary to complex; the statistical description of populations and complex systems; the design process; pulling together multiple considerations to achieve a practical, manufacturable, durable design of products and systems.

Mathematics, including aspects of probability and statistics, is integrally woven into the courses through problem solving methods of inquiry. All of the courses include laboratory sessions in small sections in which students conduct experiments and explore the concepts discussed in the lectures.

All of the tracks are three quarters long. Because of the interdisciplinary nature of the courses, students must start Autumn Quarter. All courses are 4 units each quarter. Students completing all three quarters satisfy the General Education Requirements in science, mathematics, and technology and applied science. Students who complete the first two quarters satisfy only one of the GER requirements in these areas (GER:2a, Natural Sciences). For students thinking of majoring in the humanities or social sciences, this program is an excellent way not only to fulfill these requirements but also to provide an active understanding of ideas and applications of science, mathematics, and engineering.

COURSES

1A, B, C. Earth Resources and the Sustainability of Life—Focuses on earth, environmental, and biological science, providing a firm scientific understanding of the complex and interrelated life support systems that are key to survival on planet Earth. Topics: energy, water, food, ecosystem and biological diversity, climate, and the tools to understand these processes. As the scientific basis for these systems is explained, consideration is given to threats posed by global change, population growth, environmental degradation, natural hazards, and the destruction of rain forests. Computer applications (use of Web to retrieve information, graphing, and data analysis) and an introduction to statistics and mathematics are essential
to collect, analyze, and interpret data. GER:2 (entire sequence must be completed)
4 units, Aut, Win, Spr (Blunt, Daily, McWilliams, Walbot, Zoback)

2A,B,C. The Heart: Principles of Life Systems—In exploring how the heart works, why it fails, and why it is frequently a cause of death, this sequence addresses the core principles of physics, chemistry, biochemistry, and biology, including issues of diagnosis, treatment, epidemiology, and the role of genetic and environmental factors in heart health. Lab component includes measurements of various heart parameters (e.g., blood pressure, electrocardiography, biochemical assays, genetic assessments of results of imaging techniques such as ultrasound and MR). The engineering component is either an examination of the design and manufacture of a sophisticated modern diagnostic instrument or the discovery, manufacture, and clinical use of a bio-technology-based cardiovascular product. GER:2 (entire sequence must be completed)
4 units, Aut, Win, Spr (Botstein, Cox, Myers, Siegmund, Simoni)

3A,B,C. Light in the Physical and Biological Worlds—Light is the most familiar of physical phenomenon and its study has had a profound effect on the development of science and technology. In the biological world, it has been decisive in fundamental questions of the evolution of life, yet some light is destructive to life. Examples and labs discuss: What is light and how is it produced? How does light interact with organic and inorganic matter? How have eyes evolved and how do we form images and perceive color? How do we use light to learn about the world, and to transmit information? Labs study the very large and small, from the speed of light to the effect of ultraviolet light on bacteria and UV mutagenesis. The uses of lasers, fiber optics, and modern devices are explored. GER:2 (entire sequence must be completed)
4 units, Aut, Win, Spr (Botstein, Cox, Myers, Siegmund, Simoni)

SCIENCE, TECHNOLOGY, AND SOCIETY

Emeriti: Alex Inkeles (Sociology), Stephen Kline (Mechanical Engineering), Walter Vincenti (Aeronautics and Astronautics) Chair: Robert McGinn (Industrial Engineering and Engineering Management; Science, Technology, and Society; and, by courtesy, Civil and Environmental Engineering) Program Committee: Faculty: James Adams (Industrial Engineering and Engineering Management, and Mechanical Engineering), Francois Bar (Communication), Stephen Barley (Industrial Engineering and Engineering Management), Paula Findlen (History), David Freyberg (Civil and Environmental Engineering), Joan Fujimura (Anthropology), James Jucker (Industrial Engineering and Engineering Management), Stephen Monismith (Civil and Environmental Engineering), Scott Sagan (Political Science), Sheri Sheppard (Mechanical Engineering), Gavin Wright (Economics).

Students: Anthony Engel, Caron Lee

Affiliated Faculty: James Adams (Industrial Engineering and Engineering Management and Mechanical Engineering), Francois Bar (Communication), Stephen Barley (Industrial Engineering and Engineering Management), Joseph Corn (History, on leave 1997-98), Paul Edwards (Science, Technology, and Society), Paula Findlen (History), David Freyberg (Civil and Environmental Engineering), Gabrielle Hecht (History, on leave 1997-98), Timothy Lenoir (History), Gilbert Masters (Civil and Environmental Engineering), Nathan Rosenberg (Economics), Scott Sagan (Political Science), Sheri Sheppard (Mechanical Engineering), Gavin Wright (Economics)

Consulting Faculty: Naushad Forbes (Science, Technology, and Society), Richard Meehan (Civil and Environmental Engineering) Technology and science are activities of central importance in modern life, intimately bound up with industrial society's evolving character, problems, and potentials. If scientific and technological pursuits are to further enhance human well-being, they and their effects on society and the individual must be better understood by non-technical professionals and ordinary citizens as well as by engineers and scientists. Issues of professional ethics and social responsibility confront technical practitioners. At the same time, lawyers, public officials, civil servants, and business people are increasingly called upon to make decisions requiring a basic understanding of science and technology and their ethical, social, and environmental consequences. Ordinary citizens, moreover, are being asked with increasing frequency to pass judgment on controversial matters of public policy related to science and technology. These circumstances require education befitting the complex sociotechnical character of the contemporary era.

Science, Technology, and Society (STS) is an interdisciplinary program devoted to understanding the nature, consequences, and shaping of technological and scientific activities in modern industrial society. Achieving this understanding requires critical analysis of the interplay of science and technology with human values and world views, political and economic forces, and cultural and environmental factors. Hence, students in STS
courses study science and technology in society from a variety of perspectives in the humanities and social sciences. To provide a basic understanding of technology and science, technical literacy courses are also included among STS offerings and are requirements in some program curricula.

GENERAL INFORMATION

Selected STS courses may be used, individually or in groups, for various purposes:
1. To satisfy University General Education Requirements
2. To satisfy the Technology in Society Requirement of the School of Engineering
3. To comprise parts of student-designed concentrations required for majors in fields such as Human Biology and Public Policy
4. To satisfy the requirements of the STS Honors Program complementing any major (see below)
5. To satisfy requirements for majors in STS (see below)
6. To satisfy requirements for a minor in STS (see below)

STS courses are particularly valuable for undergraduates planning further study in graduate professional schools (for example, business, education, engineering, law, journalism, medicine) and for students wishing to relate the specialized knowledge of their major fields to broad technology- and science-related aspects of modern society and culture.

UNDERGRADUATE PROGRAMS

Degree programs in STS are interdisciplinary curricula devoted to understanding the nature and significance of technology and science in modern society. Majors analyze phenomena of science and technology in society from ethical, aesthetic, historical, economic, and sociological perspectives. In addition, students pursuing the A.B. degree study a technical field in sufficient depth to obtain a grasp of basic concepts and methods, and complete a concentration on a theme, subarea, or problem related to science and technology in society. Those seeking the B.S. degree complete at least 50 units in technology, science, and mathematics. The particular technical courses chosen reflect the student’s special interest in science and technology in society. Specific requirements for the bachelor’s degree in STS are as follows:

BACHELOR OF ARTS

1. STS Core (eight courses):
   a) Foundational course (STS 101)
   b) Disciplinary Analyses (five courses with no more than two courses in each category):
      1) Philosophical perspectives (STS 110, 118)
2) Historical perspectives (STS 121, 122, 124, 130, 131)
3) Social Science perspectives (STS 107, 137, 162, 172)
c) Advanced courses (one course in each category):
   1) Disciplinary analysis (STS 207, 215, 219, 221, 222, 231, 232, 243, 246, 253, 266)
   2) Senior Colloquium (STS 200)
2. Technical Literacy (five courses):
   a) Computer literacy, normally demonstrated by successfully completing Computer Science 106A or its equivalent.
   b) Science or engineering literacy demonstrated by one of the following:
      1) Completing a four-course sequence (minimum of 12 units) in one field of engineering or science (sample sequences available in the STS office).
      2) Completing four of the following “Engineering Fundamentals” courses: Engineering 14, 15, 20, 30, 40, 50, 60, 70 (see the descriptions in the “School of Engineering” section of this bulletin.
3. Thematic Concentration (minimum of 20 units, at least five courses, one each from among those designated on the appropriate concentration course list as “foundational” and “advanced”). Thematic Concentrations are organized around a science- or technology-related problem or area. The following Thematic Concentration topics have been preapproved: the intersections of technology and science with aesthetics, development, history and philosophy, information, public policy, social change, and work and organizations.

Course lists for these concentration topics are available in the STS office. A student selecting one of the certified topics may include one or more courses not on the corresponding course list if they are germane to the concentration and meet the student’s special interests. Alternatively, the student may choose to design a Thematic Concentration topic and course package subject to program approval. Each Thematic Concentration, certified or self-designed, requires the signature of an appropriate faculty adviser. See the program chair for details.

BACHELOR OF SCIENCE

The student pursuing the B.S. degree shall complete the STS Core and a package of at least 50 units of technical courses designed to impart not only an understanding of, but an ability to work with, basic concepts of engineering and science. Introductory courses in mathematics or physics (for example, Math. 19 or Physics 19) are normally not counted as parts of this technical depth component.
The B.S. candidate follows one of two models in fulfilling the minimum 50-unit requirement:

1. "Focused depth": at least 24 units and seven courses in a single field of science or engineering, with the remaining units (except for at most two stand-alone courses) grouped in clusters of at least three courses each in other fields of science or engineering. For example, a Focused Depth package might contain eight industrial engineering, three physics, three mathematics, and three computer science courses, and one course each in electrical engineering and chemistry.

2. "Clustered depth": Two or more clusters of at least five courses and 15 units each in different fields of science or engineering, with at most two stand-alone courses, and remaining courses, if any, in sequences of three or more courses. For example, a Clustered Depth package might contain five courses each in computer science, electrical engineering, physics, and one course each in industrial engineering and earth sciences, and three courses in civil engineering.

It is strongly recommended that B.S. majors complete Computer Science 106A or its equivalent.

MINORS

Students planning careers in many technical and non-technical fields, including business, education, engineering, science, law, medicine, and public affairs, are faced with important STS issues in their professional practice. Therefore, a minor in STS is likely to prove practically valuable as well as intellectually stimulating.

Requirements—The STS minor requires successful completion of six courses satisfying the following four requirements:

1. Foundational Course (STS 101)
2. One disciplinary analysis course from each of the following three categories
   a) Philosophical/Ethical Perspectives (STS 110, 115, 118, 174)
   b) Historical Perspectives (STS 121, 122, 124, 130, 131)
   c) Social Scientific/Policy (STS 107, 137, 162, 170, 171, 172)
3. Two advanced courses, from one or two of the following categories, building on courses taken under requirements 1 and 2:
   a) Philosophical/Ethical Perspectives (STS 215)
   b) Historical Perspectives (STS 221, 222, 253)
   c) Social Scientific/Policy Perspectives (STS 207, 219, 231, 246, 266, 279)
4. At least one of the courses taken under requirements 1 to 3 must incorporate a weekly small group discussion.

Note—Students wishing to use a course not listed above to satisfy one of the requirements for a minor in STS may petition to do so. For details, inquire at the STS office (Bldg. 370, room 109).

HONORS PROGRAM

STS offers a limited number of students an opportunity to achieve honors through in-depth study of the interaction of science and technology with society. The honors program is open to students majoring in any field (including STS). Students accepted for this program carry out an honors project, the work for which normally begins in Spring Quarter of the junior year and is completed by mid-May of the senior year. Usually, this project entails writing an honors essay, although occasionally students have chosen to produce a technical artifact or carry out some other work that itself represents original thinking. When a project results in a work other than an essay, students must also submit an accompanying written explanation of the work.

ADMISSION

Application for admission to the STS honors program is typically made during the student's junior year. By May 15 of that year, interested students must have completed at least two of the first four course requirements listed below for honors and have submitted a detailed formal proposal for their project to the STS Honors Committee (for details on submitting a proposal, see the brochure, Honors Program Requirements, available in the STS office). Students whose proposals are approved may then take from 12 to 15 units of credit for work on the honors project, distributed so as best to support the student's academic progress. Under exceptional circumstances, students may be admitted to the honors program in Autumn Quarter of the senior year. STS majors pursuing honors in STS or another honors program take the STS Core Senior Colloquium for 2 units instead of 4 and do not write a research paper for this course.

REQUIREMENTS

1. Foundational Course: STS 101.
2. Philosophical and Ethical Perspectives: STS 110 or 118.
3. Historical Perspective: STS 121, 122, 124, 130, 131, or 152.
4. Social Science Perspective: STS 107, 137, 162, 171, or 172.
5. Honors Project: an original critical essay (or investigative project with accompanying explanatory essay) on an STS topic of general importance (12 to 15 units). Past honors projects are on file in the STS library.

To earn honors, the project must receive a grade of at least 'B.' The student not majoring in STS must also achieve a grade point average (GPA) of at least 3.3 in the courses taken to satisfy re-
requirements 1 to 4 above. In the case of STS majors, the student must compile an GPA of at least 3.3 in the entire STS core. If all these requirements are met, the designation "Honors Program in Science, Technology, and Society" is affixed to the student's permanent record and appears in the commencement program. Failure to complete honors thesis requires completion of additional research work for the Senior Colloquium.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

The STS Web site (http://www-leland.stanford.edu/group/STS/) contains updated course scheduling information, course syllabi, faculty and staff information, and forms for declaring a major or a minor in STS.

51. The Nature of Engineering—(Same as Engineering 1.) The engineering process and the people and organizations involved in engineering. Topics: some history; nature and source of engineering problems; interaction between engineering, science, mathematics, and business; the nature of the intellectual disciplines involved in engineering; and specific aspects of the engineering process, e.g., design, development and test, production, research. Examples from engineering programs at Stanford. Lectures, problem sets, design exercises, writing assignments, and field trips. GER:2b (DR:6)

3 units, Aut (Freyberg)

101. Science, Technology, and Contemporary Society—(Graduate students register for 201; same as Engineering 130.) Analysis of the interplay of science, technology, and society in the contemporary U.S. Topics: key social, cultural, and values issues raised by contemporary scientific and technological developments; distinctive features of science and engineering as socio-technical activities; major influences of scientific and technological developments on 20th-century society, including transformations and problems of work, leisure, human values, the fine arts, and international relations; ethical conflicts in scientific and engineering practice; and the social shaping and management of contemporary science and technology. GER:3b (DR:9)

4-5 units, Aut (McGinn)

107. Technology and Economic Change—(Enroll in Economics 113.)

5 units, Win (Rosenberg)

110. Ethics and Public Policy—(Same as Public Policy 103B.) Ethical issues in science- and technology-related public policy conflicts. Develops the capacity for rigorous critical analysis of complex, value-laden policy disputes. Topics: the nature of ethics and morality; the nature of and rationales for liberty, justice, and human rights; and the use and abuse of these concepts in recent and current policy disputes. Cases from: biomedicine, environmental affairs, the technical professions, communications, and international relations. GER:3b (DR:8) (WIM)

5 units, Win (McGinn)

114A. Stanford Introductory Seminar: Classical Professionalism—Preference to sophomores. Analysis of ethical issues raised by the ways humans have altered natural and human-made environments in contemporary Western societies. Topics: endangered species, wilderness preservation, climate change, cross-border pollution, toxic waste disposal, population growth, genetically engineered animals, traffic congestion, the proliferation of tall buildings, the technological "soundscape," and urban public space. Enrollment limited to 12.

3-4 units (Meehan) not given 1997-98

114Q. Stanford Introductory Seminar: Environmental Ethics—Preference to sophomores. Analysis of ethical issues raised by the ways humans have altered natural and human-made environments in contemporary Western societies. Topics: endangered species, wilderness preservation, climate change, cross-border pollution, toxic waste disposal, population growth, genetically engineered animals, traffic congestion, the proliferation of tall buildings, the technological "soundscape," and urban public space. Enrollment limited to 12.

3-4 units, Aut (McGinn)

115. Ethical Issues in Engineering—(Same as Engineering 131.) Ethical issues in contemporary engineering practice. Topics: the moral rights and responsibilities of engineers in relation to society, employers, colleagues, and clients; cost-benefit-risk analysis, safety, and informed consent; the ethics of whistle blowing; ethical conflicts of engineers as expert witnesses, consultants, and managers; ethical issues in engineering design, manufacturing, and operations; ethical issues arising from engineering work in foreign countries; and ethical implications of the social and environmental contexts of contemporary engineering. Use of real-life case studies, guest practitioners, and field research. Limited enrollment.

4 units (McGinn) given 1998-99

116. War and Technology—The role of technology, military and civil, in human conflict and the influence of war upon the directions of technology. Theories of aggression, origins of organized violence, and the changing relationship between specific technological innovations and warfare in history. People have traditionally applied technology in warfare and supported its development for that purpose. In the process, warfare has changed drastically and the overall directions of technology have been biased in certain directions. An examination of this interaction. Readings, lectures, films, guest speakers, projects, and field trips.

4 units Win (Adams)

118. Good Products, Bad Products—(Same as Industrial Engineering 214, Mechanical Engineer-
Analysis of the characteristics of industrial products that can cause them to be successes or failures. These range from the straightforward (performance, economy, reliability) through the complicated (human and cultural fit, compatibility with the environment, craftsmanship, positive emotional response to the user) to the esoteric (elegance, sophistication, symbolism.) Engineers and business people must better understand these factors if they are to produce more successful products. Readings, lectures, projects, papers, guest speakers, and field trips. Enrollment limited.

3 units, Win (Adams)

121. Technology and Culture in the 19th-Century America—(Enroll in History 115.)
4-5 units (Corn) given 1998-99

122. Undergraduate Colloquium: Technology and Culture in 20th-Century America and Europe—(Enroll in History 234A.)
5 units, Win (Lecuyer)

123. Colloquium: Technology and Society—(Enroll in History 234B.)
5 units (Hecht) not given 1997-98

124. American Economic History—(Enroll in Economics 116.)
5 units, Aut (Wright)

130. The Darwinian Revolution—(Enroll in History 133.)
4 units (Lenoir) not given 1997-98

131. The Industrial Revolution: Historical and Cultural Perspectives—(Enroll in History 134A.)
5 units (Hecht) not given 1997-98

137. The National Information Infrastructure; The U.S. Policy Debate—(Enroll in Communication 137/237.)
5 units, Aut (Bar)

160. Technological Opportunities for Humanity—Opportunities for new technologies in daily life based on present science. Criteria for technological advances to be useful and wanted by individuals. Obstacles to implementation and the use of different kinds of technologies. Products vs. systems. Discrepancies between what people want and use and what is thought to be good. Technology in fiction, especially science fiction. Futurism. Anti-technological attitudes and movements. Technologies include computers, transportation of goods and people, medicine, utilities, space travel.

3 units, Win (McCarthy)

161. History of Computers—The evolution of concepts and devices in computing from the 19th century to the present, focusing on the social, political, and cultural context of digital computer development from 1940 onward. Topics: relationships between the Cold War and computer research; the rise of hacker culture, economic impacts of computers; IBM, Apple, and other major corporate developers; science fiction about computers and networks. Emphasis is on the relationship between the micro level of engineering and the macro levels of economic, governmental, and social forces. Prerequisite: familiarity with basic concepts of computation.

4-5 units, Win (Edwards)

162. Computers and Interfaces: Psychological and Social Issues—(Enroll in Communication 169/269.)
4 units, Win (Nass)

170. Work, Technology, and Society—(Enroll in Industrial Engineering 170.)
4 units, Spr (McGinn)

3 units, Aut (May)

3 units, Spr (North, May)

174. Ethical Issues in Civil Engineering—(Enroll in Civil and Environmental Engineering 174.)
4 units, Spr (McGinn)

180. Dispute Resolution for Engineers—The role of technical experts in managing uncertainty arising from conflicting interests, perceptions, culture, reasoning, and rhetoric. Insurance, litigation, ADR, negotiation. Active participation in simulated and real disputes required. Enrollment limited to 20.

3-4 units (Meehan) not given 1997-98

190A,B,C. Honors Project—Project for students in STS honors program.
190A. Submission of Proposal
2-5 units, Aut, Win, Spr (Staff)
190B. Continued Study and Writing
2-5 units, Aut, Win, Spr (Staff)
190C. Final Work on Project
2-5 units, Aut, Win, Spr (Staff)

195. Honors Tutorial
1 unit, Aut, Win (Staff)

199. Individual Work
1-5 units, Aut, Win, Spr (Staff)

200. Senior Colloquium—Reading/discussion of key analytical and theoretical texts treating the nature and relationship of science, technology, and society. Prerequisite: senior standing and four STS core courses, or consent of the instructor.
4 units, Win (Edwards)

ADVANCED UNDERGRADUATE AND GRADUATE

4-5 units, Aut (McGinn)
207. Science and Technology in Economic Growth—(Enroll in Economics 224.)
5 units, Win (Rosenberg)

215. Computers, Ethics, and Social Responsibility—(Enroll in Computer Science 201.)
3 units, Win (Roberts)

219. Management and Organization of Research and Development—(Enroll in Industrial Engineering 220.)
3 units, Spr (Barley)

221. Undergraduate Colloquium: The Automobile Industry in 20th-Century America—(Enroll in History 263A.)
5 units (Corn) not given 1997-98

222. Undergraduate Research Seminar: Science and High-Technology in Silicon Valley, 1930-80—(Enroll in History 262S.)
5 units (Lenoir) not given 1997-98

223. Graduate Colloquium: Technology and Society—(Enroll in History 334A.) See 123.
4-5 units (Hecht) not given 1997-98

231. Technology and Work—(Enroll in Industrial Engineering 223.)
4 units (Barley) given 1998-99

232. Science, Technology and Society—(Enroll in Anthropology 232, History and Philosophy of Science 232.)
5 units, Spr (Fujimura)

243. Graduate Colloquium: Technology, Work, and Culture in Comparative Perspective—(Enroll in History 336A.)
4-5 units (Hecht) not given 1997-98

246. Feminist Theories of Science and Technology—(Enroll in Anthropology 246.)
5 units (Fujimura) not given 1997-98

250. The Politics of Technical Decisions—Many public choices involve decisions where technical or technological issues are inseparable from political factors. Seminar covers technical policymaking since WW II in the political, social, cultural, and economic context. Technical decisions within regulatory agencies, origins and functioning of key institutions (National Science Foundation, Environmental Protection Agency, Department of Defense). Historical and contemporary case studies of particular technical issues, e.g., the national Information Infrastructure, global warming, AIDS research, race and intelligence testing, or nuclear missile defense. Case studies are chosen in consultation with students. Enrollment limited to 15 advanced undergraduates and graduates.
4-5 units (Edwards) not given 1997-98

253. Body Works: Medicine, Technology, and the Body in Late 20th-Century America—(Enroll in History 274A/374A.)
4-5 units, Win (Lenoir)

266. Communication Policy in Comparative Perspectives—(Enroll in Communication 166/266.)
5 units, Win (Bar)

279. Technology Policy and Management in Newly-Industrializing Countries—(Same as Industrial Engineering and Engineering Management 279.) Technology is seen as the key to development and prosperity in most parts of the world. Building technological capability in newly-industrializing countries at the national and firm level. What makes technology special, government intervention that affects technology, the concept of technology leader and technology follower environments, the transfer of technology from "leader" countries, indigenous technological capability, human capital, culture and innovation, the role of small firms and new enterprises in technological capability. Managing innovation in firms: how innovation is different in technology-followers, organizing for shop-floor innovation, building an innovation culture, the special role of R&D in followers, the role of design, technology strategy for followers. Cases from Korea, India, Brazil, Singapore, and other NICs.
2-4 units, Aut (Forbes) starts October 6

2-3 units, Win (Forbes)

299. Individual Graduate Work
1-5 units, Aut, Win, Spr (Staff)

RELATED DEPARTMENT OFFERINGS

ANTHROPOLOGY

160. Gender and Science—(Same as History and Philosophy of Science 160.)
5 units (Fujimura) not given 1997-98

162A. Social and Cultural Studies of Biotechnology—(Same as History and Philosophy of Science 162.)
5 units (Fujimura) not given 1997-98

ECOMONICS

115. European Economic History
5 units, Win (Voth)

GERMAN STUDIES

175A. Modernization, Technology, and Culture in Germany, 1900 to 1945
4 units, Win (Lowood)

HISTORY

133A. The Rise of Scientific Medicine
5 units, Spr (Lenoir)
139. The Scientific Revolution  
5 units, Spr (Hart)

152. American Spaces: An Introduction to Material Culture and the Built Environment—(Same as American Studies 152.)  
5 units (Corn) given 1998-99

MATERIALS SCIENCE AND ENGINEERING

159Q. Stanford Introductory Seminar: Research in Japanese Companies  
3 units, Spr (Sinclair)

POLITICAL SCIENCE

125. The Rise of Industrial Asia  
5 units, Aut (Oi, Oksenberg, Raphael, Rohlen)

OVERSEAS STUDIES

Descriptions of these courses are in the “Overseas Studies” section of this bulletin or at the Overseas Studies office, 126 Sweet Hall.

5 units, Aut (Neckenig)

119V. Architecture and the City, 1871-1990: Berlin as a Nucleus of Modernity—(Same as Overseas Studies 143U.) Berlin.  
4 units, Win (Neckenig)

120V. Industry, Technology and Culture, 1780-1945—Berlin.  
5 units, Spr (Neckenig)

125V. The Scientific Revolution: From the Renaissance to the 18th Century—(Same as Overseas Studies 215.) Florence.  
4-5 units, Win (La Vergata)

SLAVIC LANGUAGES AND LITERATURES

Emeriti: (Professors) Joseph Frank*, Joseph A. Van Campen; (Assistant Professor) Elisabeth Stenbock-Fermor  
Chair: Richard D. Schupbach  
Professors: Lazar Fleishman, Gregory Freidin (on leave 1997-98), Richard D. Schupbach  
Associate Professor: Monika Greenleaf  
Assistant Professor: Stephen Moeller-Sally  
Acting Assistant Professor: Andrey Arkhipov  
Senior Lecturer: Rima Greenhill  
Lecturers: Jack E. Kollmann, Serafina Radivilova, Wojciech Zalewski  
Visiting Professor: Evgeny Dobrenko

* Recalled to active duty.

The department accepts candidates for the degrees of Bachelor of Arts, Master of Arts, and Doctor of Philosophy. Particular requirements for each degree are described below.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The Department of Slavic Languages and Literatures offers two concentrations for undergraduate majors: Russian Language and Literature, and Russian Language, Culture, and History.

RUSSIAN LANGUAGE AND LITERATURE

The concentration in Russian Language and Literature is designed for those students who desire to gain a firm command of the Russian language and to study the nation’s literary tradition. Emphasis is placed on the linguistic and philological study of literature, as well as the history of Russian literature and related media in the broader context of Russian culture. Students may explore historically related literary traditions (for example, French, German, English), as well as other related fields. The Russian Language and Literature concentration also welcomes students with an interest in Russian and Slavic linguistics.

PREREQUISITE

Successful completion of Slavic 51, 52, 53, or the equivalent as determined by the results of the department placement examination, is a prerequisite for a concentration in Russian Language and Literature.

REQUIREMENTS

Candidates for the A.B. degree with a concentration in Russian Language and Literature must complete an additional 55 units according to the following distribution.

Russian Language—A minimum of 15 units selected from the following Slavic Languages and Literatures courses: 111, 112, 113, 177, 178, 179, 181, 182, 183.

Russian Literature—The 20-unit core literature sequence consisting of the following Slavic Languages and Literatures courses: 145, 146, 147, 187, 188.

Electives—Students must take 20 units of electives embracing at least two of the following categories: (1) Russian language or linguistics, (2) Russian literature, (3) historically related literatures. These courses are selected in consultation with the Undergraduate Director. With department permission, work in related academic fields may apply toward the degree requirements.

Majors who concentrate in Russian Language and Literature must earn a grade point average (GPA) of ‘C’ or better in order to receive credit toward the major.
RUSSIAN LANGUAGE, CULTURE, AND HISTORY

The concentration in Russian Language, Culture, and History is for students who would like to obtain a firm command of the Russian language and to pursue a broad, interdisciplinary study of Russian literature, other expressive media (including film), as well as cultural traditions and institutions. Emphasis is placed on the relation of the Russian literary tradition to disciplines that have enriched the historical understanding of Russian literature: primarily history, but also anthropology, sociology, political science, and communications.

PREREQUISITE

The prerequisite for a concentration in Russian Language, Culture, and History is the successful completion of Slavic 51, 52, 53 or the equivalent as determined by the results of the department placement examination.

REQUIREMENTS

Candidates for the A.B. degree with a concentration in Russian Language, Culture, and History must complete an additional 55 units according to the following distribution.

Russian Language—A minimum of 15 units selected from the following Slavic Languages and Literatures courses: 111, 112, 113, 177, 178, 179, 181, 182, 183.

19th-Century Russian Literature and History—

A minimum of 8 units chosen from the following courses or the equivalent: Slavic 141, 145, 146; History 120B. Students must choose one course from Slavic and one course from History.

20th-Century Russian Literature and History—

A minimum of 8 units chosen from the following courses or the equivalent: Slavic 142, 147; History 120C. Students must choose one course from Slavic and one course from History.

Electives—In order to complete the basic degree requirements, students must take 24 additional units of course work embracing at least two of the following categories: (1) Russian language, (2) Russian literature, (3) Russian history. These courses are selected in consultation with the Undergraduate Director. With department permission, work in related academic fields (for example, anthropology, sociology, religion, political science, communications) may apply toward the degree requirements.

Majors with a concentration in Russian Language, Culture, and History must earn a GPA of "C" or better in order to receive credit toward the major.

WRITING IN THE MAJOR REQUIREMENT

All Stanford undergraduates who entered in 1996-97 or thereafter are required by the University to pass at least one writing-intensive course in their field of concentration in order to graduate. Majors in Russian Language and Literature or Russian Literature, History, and Culture may satisfy the writing requirement by enrolling in and receiving a passing grade in Slavic 157/Humanities 194M.

MINORS

The Department of Slavic Languages and Literatures offers three undergraduate minor programs in Russian Language, Literature, and Culture.

The minor program is designed for students who, while pursuing a major in another program, seek a comprehensive introduction to Russian culture, whether primarily through (1) the Russian language courses; or (2) a combination of minimal proficiency in Russian and courses in the history of Russian culture; or, (3) courses on Russian literature in translation and, depending on the student's interest, other forms of the country's cultural expression as well as its social institutions. Students seeking a Slavic minor are particularly encouraged to take advantage of Stanford's Overseas Studies Program in Moscow.

RUSSIAN LANGUAGE

Prerequisites—The minor concentration in Russian Language requires the successful completion of Slavic 1A, 2B, 3C (First-Year Russian) and Slavic 51, 52, 53 (Second-Year Russian), or a demonstrated equivalent competence as determined by the departmental Russian language placement examination.

Requirements—Candidates for an A.B. degree with a minor concentration in Russian Language must complete 24 units of Russian language and literature courses according to the following distribution: 12 to 15 units selected from Slavic 111, 112, 113, 177, 178, 179, 181, 182, 183. The remaining 9 to 12 units should be selected from Slavic 145, 146, 147, 187, 188, other monograph courses offered by the Department of Slavic Languages and Literatures or, with the approval of the Slavic department's undergraduate advisor, in history, politics, linguistics, or other relevant programs.

RUSSIAN LANGUAGE, LITERATURE, AND CULTURE

Prerequisites—The minor concentration in Russian Language, Literature, and Culture requires the successful completion of Slavic 1A, 2B, 3C (First-Year Russian) or the equivalent as determined by the departmental Russian language placement examination.

Requirements—Candidates for an A.B. degree with the minor concentration in Russian Language, Literature, and Culture must complete 28 units according to the following distribution:
1. A minimum of 16 units of courses on literature and culture selected from the following Slavic Languages and Literatures courses: two quarters in the 145, 146, 147 sequence (Russian Literature in English Translation); or one quarter in the 145, 146, 147 sequence and one quarter in the 187, 188 sequence (Russian Poetry; prerequisite: Second-Year Russian); and, at least, one monograph course focusing on a single writer.

2. 12 units of elective courses either in the Department of Slavic Languages and Literatures or, with the approval of the Slavic department’s undergraduate adviser, in history, politics, linguistics, or other relevant programs.

RUSSIAN CULTURE
Candidates for an A.B. degree with the minor concentration in Russian Culture must complete 36 units according to the following distribution:

a. A minimum of 20 units of courses on literature and culture selected from the following Slavic Languages and Literatures courses—three quarters in the 145, 146, 147 sequence (Russian Literature in English Translation) and two monograph courses focusing on a single writer. In addition, one course in Russian history is selected from History 120B or 120C. No knowledge of Russian is required.

Electives—11 units of elective courses either in the Department of Slavic Languages and Literatures or, with the approval of the Slavic department’s undergraduate adviser, in history, political science, art, linguistics, or other relevant programs.

The deadline for minor declarations in all concentrations is no later than the last day of the third quarter before degree conferral.

HONORS PROGRAM
Students in either concentration with a GPA of 'B+' or better in their major courses are eligible to participate in the department’s honors program. In addition to the basic program requirements above, honors students must also complete the following:

1. One advanced course, usually taken during the Spring Quarter of the junior year and related to the area of the student’s expected research. Majors in either concentration who propose a senior project in literature select their course in consultation with the Undergraduate Director.

2. Slavic 199, Individual Work: a minimum of 8 units during the senior year. To qualify for honors, the candidate must receive a grade of 'B' or better on the thesis or project completed during this period.

OVERSEAS STUDIES
The department encourages students to enhance their education with a term abroad. For information about the Stanford-in-Moscow program, see the “Overseas Studies” section of this bulletin or the Overseas Studies office. Most credits earned in Moscow can be applied to both undergraduate concentrations. Cultural awareness and language ability are enhanced by living with a Russian family in Moscow.

GRADUATE PROGRAMS
MASTER OF ARTS
Admission—The requirements for admission to the master's degree program in Russian are:

1. A Bachelor of Arts degree (or its equivalent) from an accredited college or university.

2. A command of the Russian language sufficient to permit the student to do satisfactory graduate work in an area of specialization.

3. A familiarity with Russian literature sufficient to permit the student to perform adequately in courses at the graduate level.

The applicant’s previous academic training in Russian language and literature must normally serve as a tentative indication of competence. Accordingly, the department does not ordinarily consider applications from students who have not had at least three years of college Russian and some undergraduate training in Russian literature of the 19th and 20th centuries.

Before registering for the first quarter’s work in the department, entering graduate students are required to take placement examinations in language and literature. Students who fail to perform satisfactorily on such examinations must register for remedial courses in the areas in which they are deficient. Such remedial courses, normally completed within the first three quarters of residence, carry no credit toward either the A.M. or the Ph.D. degree.

Students in either concentration with a GPA of 'B+' or better in their major courses are eligible to participate in the department’s honors program. In addition to the basic program requirements above, honors students must also complete the following:

1. One advanced course, usually taken during the Spring Quarter of the junior year and related to the area of the student’s expected research. Majors in either concentration who propose a

   a. A minimum of 16 units of courses on literature and culture selected from the following Slavic Languages and Literatures courses: two quarters in the 145, 146, 147 sequence (Russian Literature in English Translation); or one quarter in the 145, 146, 147 sequence and one quarter in the 187, 188 sequence (Russian Poetry; prerequisite: Second-Year Russian); and, at least, one monograph course focusing on a single writer.

   b. 12 units of elective courses either in the Department of Slavic Languages and Literatures or, with the approval of the Slavic department’s undergraduate adviser, in history, politics, linguistics, or other relevant programs.

RUSSIAN CULTURE
Candidates for an A.B. degree with the minor concentration in Russian Culture must complete 36 units according to the following distribution:

a. A minimum of 20 units of courses on literature and culture selected from the following Slavic Languages and Literatures courses—three quarters in the 145, 146, 147 sequence (Russian Literature in English Translation) and two monograph courses focusing on a single writer. In addition, one course in Russian history is selected from History 120B or 120C. No knowledge of Russian is required.

Electives—11 units of elective courses either in the Department of Slavic Languages and Literatures or, with the approval of the Slavic department’s undergraduate adviser, in history, political science, art, linguistics, or other relevant programs.

The deadline for minor declarations in all concentrations is no later than the last day of the third quarter before degree conferral.

HONORS PROGRAM
Students in either concentration with a GPA of 'B+' or better in their major courses are eligible to participate in the department’s honors program. In addition to the basic program requirements above, honors students must also complete the following:

1. One advanced course, usually taken during the Spring Quarter of the junior year and related to the area of the student’s expected research. Majors in either concentration who propose a senior project in literature select their course in consultation with the Undergraduate Director.

2. Slavic 199, Individual Work: a minimum of 8 units during the senior year. To qualify for honors, the candidate must receive a grade of ‘B’ or better on the thesis or project completed during this period.

OVERSEAS STUDIES
The department encourages students to enhance their education with a term abroad. For information about the Stanford-in-Moscow program, see the “Overseas Studies” section of this bulletin or the Overseas Studies office. Most credits earned in Moscow can be applied to both undergraduate concentrations. Cultural awareness and language ability are enhanced by living with a Russian family in Moscow.

GRADUATE PROGRAMS
MASTER OF ARTS
Admission—The requirements for admission to the master’s degree program in Russian are:

1. A Bachelor of Arts degree (or its equivalent) from an accredited college or university.

2. A command of the Russian language sufficient to permit the student to do satisfactory graduate work in an area of specialization.

3. A familiarity with Russian literature sufficient to permit the student to perform adequately in courses at the graduate level.

The applicant’s previous academic training in Russian language and literature must normally serve as a tentative indication of competence. Accordingly, the department does not ordinarily consider applications from students who have not had at least three years of college Russian and some undergraduate training in Russian literature of the 19th and 20th centuries.

Before registering for the first quarter’s work in the department, entering graduate students are required to take placement examinations in language and literature. Students who fail to perform satisfactorily on such examinations must register for remedial courses in the areas in which they are deficient. Such remedial courses, normally completed within the first three quarters of residence, carry no credit toward either the A.M. or the Ph.D. degree.

Students in either concentration with a GPA of 'B+' or better in their major courses are eligible to participate in the department’s honors program. In addition to the basic program requirements above, honors students must also complete the following:

1. One advanced course, usually taken during the Spring Quarter of the junior year and related to the area of the student’s expected research. Majors in either concentration who propose a senior project in literature select their course in consultation with the Undergraduate Director.

2. Slavic 199, Individual Work: a minimum of 8 units during the senior year. To qualify for honors, the candidate must receive a grade of 'B' or better on the thesis or project completed during this period.

OVERSEAS STUDIES
The department encourages students to enhance their education with a term abroad. For information about the Stanford-in-Moscow program, see the "Overseas Studies" section of this bulletin or the Overseas Studies office. Most credits earned in Moscow can be applied to both undergraduate concentrations. Cultural awareness and language ability are enhanced by living with a Russian family in Moscow.

GRADUATE PROGRAMS
MASTER OF ARTS
Admission—The requirements for admission to the master’s degree program in Russian are:

1. A Bachelor of Arts degree (or its equivalent) from an accredited college or university.

2. A command of the Russian language sufficient to permit the student to do satisfactory graduate work in an area of specialization.

3. A familiarity with Russian literature sufficient to permit the student to perform adequately in courses at the graduate level.

The applicant’s previous academic training in Russian language and literature must normally serve as a tentative indication of competence. Accordingly, the department does not ordinarily consider applications from students who have not had at least three years of college Russian and some undergraduate training in Russian literature of the 19th and 20th centuries.

Before registering for the first quarter’s work in the department, entering graduate students are required to take placement examinations in language and literature. Students who fail to perform satisfactorily on such examinations must register for remedial courses in the areas in which they are deficient. Such remedial courses, normally completed within the first three quarters of residence, carry no credit toward either the A.M. or the Ph.D. degree.

Course Requirements—Candidates for the A.M. who are not also candidates for the Ph.D. should plan course work that ensures adequate preparation for the A.M. final examination at the end of the third quarter of work. Ph.D. candidates with a concentration in language and linguistics should include in the first year’s work any courses needed for the A.M. examination in that area. Ph.D. candidates with a concentration in litera-
tute should attempt to include as many of the department’s basic course offerings as possible in the first-year program to ensure sufficient time to complete the A.M. thesis during the fifth quarter of registration. In any case, course work should be planned in consultation with the graduate adviser, whose written approval of the overall course load is required.

Candidates for the A.M. must complete a program of 36 units, of which 27 units must be selected from courses given by the department. The other 9 units may, with approval of the candidate’s adviser, be selected from courses in related fields. Of the 27 units in the department, a minimum of 9 must be in language and a minimum of 9 in literature. The remaining 9 may be distributed in accordance with needs and interests of the student, with advice and approval of the department adviser.

No credit toward the A.M. degree is allowed for first- or second-year courses in non-Slavic languages required for the Ph.D. degree.

Final Examination—Students not enrolled in the Ph.D. program may either submit an A.M. thesis or take a final examination. In the latter case, regardless of the area of specialization, the student must demonstrate in a written examination: (1) command of the phonology, morphology, syntax, and lexicology of contemporary Standard Russian sufficient to teach beginning and intermediate courses at the college level; (2) an ability to read contemporary Standard Russian sufficient to assist students studying contemporary Russian poetry or literary prose; and (3) sufficient familiarity with Russian literature of either the 19th or 20th century to handle successfully survey courses dealing with a chosen period of specialization.

The examination should be passed at the end of the final quarter of required course work.

MASTER OF ARTS IN TEACHING

The degree of Master of Arts in Teaching is offered jointly by the department and the School of Education. It is intended for candidates with a teaching credential or relevant teaching experience who wish to further strengthen their academic preparation. Requirements for the degree are outlined in the “School of Education” section of this bulletin. The program includes 45 units, of which 25 must be in the teaching field and 12 in education. Specific language requirements are established in consultation with the department.

DOCTOR OF PHILOSOPHY

Students enrolled in the Ph.D. program in Slavic Languages and Literatures are expected to fulfill the following requirements:

1. Minor or Related Fields: during the course of study, students must develop substantial exper-

tise in a field contiguous to the area of specialization. A candidate may elect to present a full minor or, in consultation with the graduate adviser, develop a special program in a related field.

a) Related Field: a student is required to complete a sequence of basic courses (12 units) in a chosen discipline outside the Department of Slavic Languages and Literatures. The choice of patterns is one of the following:

1) A sequence of three courses in one Western European literature, selected in consultation with the adviser, or

2) three basic courses in comparative literature to be selected in consultation with the graduate adviser and the Department of Comparative Literature.

b) Minor: if the student elects a minor (for example, French, German, Spanish, or Russian history) he or she should take six graduate courses in that department with a minimum of 20 units at the graduate level, according to the minor requirements established by that department. Students considering minors in other areas, such as Asian languages, English, or comparative literature, should consult with the adviser, the Chair of the Department of Slavic Languages and Literatures, and the chair of the minor department. Students who wish to enroll in the Graduate Program in the Humanities should apply there.

2. Admission to Candidacy: candidates should read carefully the general regulations governing the degree, as described in the “Graduate Degrees” section of this bulletin. For specific department requirements and recommendations, the student should consult with the department graduate adviser. No student is accepted as a candidate until the equivalent of the A.M. degree requirements, including thesis described above, are completed. (Ph.D. students in literature may not opt for a written examination.) Admission to candidacy is determined by the end of the fifth quarter of graduate studies. The candidate by that time must have demonstrated commitment to graduate studies by completion of a minimum of 60 quarter units of credit with a grade point average (GPA) of ‘B+’ or better. Candidates specializing in literature must have submitted to the faculty three seminar papers completed in the Department of Slavic Languages and Literatures and must have completed an acceptable thesis before the end of the fifth quarter, and those specializing in Slavic linguistics must have passed a written examination based on course materials and a reading list. Failure to comply with the above requirements results in termination of enrollment for the Ph.D. degree. The terminated student may, at the discretion of the faculty, be
given the opportunity to take the A.M. written examinations. If successful, the student is then awarded the A.M. degree, but is not accepted as a candidate for the Ph.D. degree.

3. **Proficiency Test:** administered for all entering graduate students, this test determines whether the student’s knowledge of Russian language and literature falls below the department’s standard. Students who fail this test are asked to complete appropriate courses in the first year of graduate study.

4. **Course Requirements:** before qualifying for the department oral and written examinations, a Ph.D. candidate is expected to accumulate at least 72 quarter units of credit for courses taken while in graduate school. No less than half of this course work (36 units) must be done in the Department of Slavic Languages and Literatures, including at least 12 units of credit for seminar-level courses. (All entering graduate students are expected to enroll in Slavic 200.) The candidate must submit to the department’s Academic Progress Committee three seminar-level papers completed at the Department of Slavic Languages and Literatures as well as the A.M. thesis.

5. **Foreign Languages:** a candidate must demonstrate reading knowledge of French and German by passing written examinations.

6. **Examinations:** a candidate must pass departmental general qualifying examinations. The written part covers:

a) The history and structure of the Russian language and its relationship to the other Slavic languages. (Students specializing in literature are excused from this portion of the examination if they have completed Slavic 211, 212, and 213 with a GPA of 'B-' or better.)

b) The history of Russian literature, including its relationship to the development of other Slavic literatures, or West European literature, or to Russian intellectual history. (Students specializing in Slavic linguistics are excused from this portion of the examination if they have completed, with a GPA of 'B-' or better, Slavic 221, 222, and either 187 or 188. They should also have taken Slavic 245, 246, and 247, or show equivalent training.)

The oral portion follows shortly after the successful completion of the written portion. The department oral examination is designed to test the students’ knowledge of the major cultural and literary trends in a period of their choice. It can be used most profitably as an opportunity to do intensive reading in the period of a candidate’s projected dissertation work. Preparation for the oral should begin immediately following the successful completion of the department’s written examination.

After consulting with members of the faculty, the student proposes a reading list, which, once approved, serves as the basis for the examination. The exam structure requires that the student make an opening presentation on a topic or set of topics of particular interest or relevance to the period in question. After an open discussion of the presentation, each examiner is given the chance to question the student on other topics related to the reading list.

Following the department examinations, a candidate must pass a University oral examination which is a defense of a dissertation proposal covering content relevant to the area of study, rationale for the proposed investigation, and strategy to be employed in the research.

**Specialization**—Candidates in Slavic Languages and Literatures specialize either in language and linguistics or in literature. Candidates may draw up individual programs of study and research in consultation with the graduate adviser. Requirements vary according to the nature of the specialized program requested.

**Continuation**—Continuation in the Ph.D. program is contingent on: for first-year students, a high quality of performance in course work (decided by department evaluation); for second-year students in literature, an A.M. thesis; and, for linguistics students, a written examination based on course materials and a reading list. Both thesis and written examination should be completed no later than the end of the second quarter of the second year.

**Course Work, Breadth Requirements, and Overall Scheduling**—

1. Candidates for the Ph.D. degree are allowed as much freedom as possible in the selection of course work to suit their individual program of study. However, candidates are held responsible for all of the areas covered by the general examinations, regardless of whether they have registered for the department’s offerings in a given field. For this reason, it is strongly recommended that before taking Ph.D. examinations, students specializing in literature complete seminar-level work directly related to the following broad areas:

a) Russian poetry
b) the Russian novel
c) 20th-century Russian literature
d) 19th-century Russian literature (the Age of Pushkin and after)
e) 18th-century Russian literature (from the early 1700s to the Age of Pushkin)
f) medieval Russian literature
g) a monograph course on a major Russian author
h) theory of literature
It should be noted that students may not normally register for individual work in a given area until they have covered the basic course offerings in that area. First-year students may register for individual work only under special circumstances and must obtain the written approval of the graduate adviser. Those candidates who are also candidates for the A.M. degree should consult the course requirements for that degree in planning their first year's work. The A.M. thesis or written examination should be completed by the end of the fifth quarter of graduate study at the latest. The remainder of the second year should be devoted to course work preparing the student for the general qualifying examination and to fulfill the requirements of the minor, if any. The department's general qualifying examinations must be taken by the end of the first quarter of the third year of study; they may be taken during the second year if the student and the adviser feel this is appropriate. During the two quarters following the general qualifying examinations, the student should be concerned primarily with preparation for the University oral examination, which should take place no later than the end of the third quarter of the third year. However, students may, if necessary, do limited amounts of course work not directly related to the dissertation proposal. The fourth year should be devoted to completion of the dissertation.

2. Students possessing the equivalent of the Stanford A.M. are normally expected to adhere to the schedule for the second, third, and fourth years of work outlined under item 1 above.

3. Students in the Ph.D. program are required to do four quarters of teaching in partial fulfillment of the requirements of the Ph.D. degree: three quarters of first-year Russian, and one quarter of literature as a teaching assistant to a faculty member (usually for one of the survey courses in translation; 145, 146, 147). While teaching a section of first-year Russian supervised by a faculty member, students are required to enroll in department's Teaching Colloquium (Slavic 206A,B,C). In addition, students must enroll in Slavic 207D, the department's TA Preparatory Course, which is offered to all graduate students in the Spring Quarter preceding their first quarter of language teaching. While enrolled in Slavic 207D, students participate in actual language teaching sections.

Non-Slavic Language Requirements—Credit toward either the A.M. or the Ph.D. degrees is not given for first- or second-year courses in non-Slavic languages. It is assumed that, on entering the program, the student has a reading knowledge of both German and French or, at the very least, one of these languages. The reading examination in one of these languages must be passed by the end of the first year of study. The reading examination in the second language must be passed by the end of the second year of study. Both language examinations must be passed before the candidate takes the University oral examination, that is, before the end of the third year.

JOINT Ph.D. IN SLAVIC LANGUAGES AND LITERATURES AND HUMANITIES

The Department of Slavic Languages and Literatures participates in the Graduate Program in Humanities leading to the joint Ph.D. degree in Slavic Languages and Literatures and Humanities. For a description of that program, see the "Humanities Special Programs" section of this bulletin.

COURSES

(WIM) indicates that the course meets the Writing in the Major requirements.

(AU) indicates that the course is subject to the University activity unit limitation (8 unit maximum).

For additional offerings in literature, see the "Comparative Literature" section of this bulletin. Students interested in languages not listed should contact the Special Language Program in the Division of Languages, Cultures, and Literatures.

GENERAL

This curriculum covers topics of general interest. Courses are open to all students and have no prerequisites. Some courses may be taken for graduate credit. Additional work in the original language may be arranged with individual instructors.

The courses:

1. Introduce students to the major authors and texts in the Russian literary and cultural tradition.
2. Offer broad conceptual frameworks for the understanding of the material covered.
3. Demonstrate the dynamic interaction between cultural texts and a variety of contexts (literary, intellectual, and socio-political).

While these goals are pursued to some extent in all of the courses, the general curriculum may be roughly classified according to contextual emphasis to assist students in choosing courses according to their interests.

Literary Movements and Genres: Slavic 145, 146, 147, 155, 156
Literature and Intellectual History: Slavic 151, 153, 157, 190
Literature and Social History: Slavic 141, 142
Media, Gender, Ethnicity: Slavic 130A, 161, 162, 163, 164, 198A
11N. Stanford Introductory Seminar: Paris, London, Petersburg—The City in the 19th-Century European Novel—Preference to freshmen. The relationship that evolved between the city and the European novel in the first half of the 19th century. As life and the world transformed around them, urban novelists realized new themes of exoticism lay within their grasp beneath the flamboyant or pious surface of a city seething in unexplored crime, poverty, and the struggle for social ascendance. Focus is on Balzac’s Lost Illusions, Dickens’s Bleak House, and Dostoevsky’s Crime and Punishment. Short supplementary readings and selected visual material provide a theoretical and historical framework for discussion. Enrollment limited to 16. GER:3a (DR:7) 3 units, Win (Moeller-Sally)

12N. Stanford Introductory Seminar: Studies in Russian—Prince Igor and Boris Godunov—Preference to freshmen. Two Russian historical operas serve as a study of the second half of 19th-century Russian history and specific features of Russian civilization. The transposition of historical and literary sources in the librettos of the operas of Borodin and Musorgsky (chronicles; the epic, The Tale of Igor; Karamzin’s History of Russian State, Pushkin’s historic drama Boris Godunov). Various stages of the work and different redactions of Musorgsky’s Boris Godunov and Borodin’s Prince Igor; the history of their productions; the role of Rimsky-Korsakov’s revisions and Chaliapin’s performance in the posthumous revival of Musorgsky’s opera. Diaghilev’s Russian Seasons in Paris and London in the early 20th century. Their impact on the language of Western music (particularly that of French impressionism and German expressionism). 3 units, Win (Fleishman)

13N. Stanford Introductory Seminar: Russia, Russian, Russians—Preference to freshmen. Overview of Russian history, literary art, and the language. 3 units, Spr (Schupbach, Freidin)

45/145/245. The Age of Experiment (1820-1864)—After the Napoleonic wars, the Russian Empire made an accelerated leap into European culture. Russian authors grappled in formally innovative ways with modern problems of individual and national identity; the invention of history, memory, repression, and lying; urban alienation and the flair for irony and the surreal that often accompanies it. Topics and texts: experiments in genre (Pushkin’s “novel-in-verse” Eugene Onegin to Gogol’s “poem-in-prose” Dead Souls); explorations of the Russian/Oriental psychological and geographic border (Pushkin’s The Prisoner of the Caucasus, Lermontov’s A Hero of our Time); the invention of the surreal capital at the empire’s heart (Pushkin’s The Bronze Horseman and The Queen of Spades, Gogol’s The Petersburg Tales, and Dostoevsky’s The Double); Tolstoy’s deceptively innocent childhood memoir and Dostoevsky’s “notes” on his own descent into the “inferno” of the Siberian labor-camps and his own consciousness. GER:3a (DR:7) 4 units, Aut (Greenleaf)

46/146/246. Violence and the Sacred in the Russian Novel: War and Peace, The Brothers Karamazov—Violence and the sacred are a central problematic in the Russian novel, specifically as a thematic expression of Russia’s confrontation with modernity. The mutually defining relationship between these two concepts in relation to religion, science, the law, and the family in the novels of Tolstoy and Dostoevsky. GER:3a (DR:7) 3-4 units, Win (Moeller-Sally)

47A/147A/247A. Russian Literature and Culture in the 20th Century—Major works of Russian fiction, including the emigre and samizdat writings, in their literary and historical context (Blok, Mayakovsky, Babel, Pasternak, Bulgakov, Solzhenitsyn, Sinyavsky, Joseph Brodsky). Main literary and artistic trends and periods (Futurism, Constructivism, Socialist Realism) in literature, music (Shostakovich), painting (Kandisky, Malevich, Tatlin, etc.), film and theater (Eisenstein, Meyerhold). (In English) GER:3a (DR:7) 3-4 units, Spr (Fleishman)

47B/147B/247B. Soviet Cinema—Taken concurrently with 47/147/247. 2 units, Spr (Fleishman)

65Q. Stanford Introductory Seminar: Art and Revolution in Russia—Preference to sophomores. Interrelationships between poetry and other arts during the Avante-Garde era. The impact of the new technological civilization on the character of artistic experiments. Readings of main works of Russian avant-garde poetry in the context of changes in the language of visual arts (Futurism, Cubism) and music (Scriabin, Prokofiev, Stravinsky). 3 units, Aut (Fleishman)

66Q. Stanford Introductory Seminar: Madness and Byzanite Civilization—Preference to sophomores. The civilization of Eastern Christianity through the prism of Russia from the Middle Ages to the 20th century. The phenomenon of the idiot saint or a “fool for Christ’s sake,” the most paradoxical cultic figure of Eastern Christianity. Readings from Greek, Syriac, and Slavic saint’s lives (sources), modern fiction (Dostoevsky), and secondary literature (Deleuze, Foucault, Meyendorff, Pelikan, etc). 4 units, Aut (Arkhipov)

91. Revolutions in Russian Theater—Russian dramatic art 1904-1936, exploring the interaction of the aesthetic revolutions in the theater and the political revolutions of 1905, 1917, and the 1930s (the
Stalin revolution). Works by Chekhov, Stanislavskii, Meyerhold, Mayakovskii, etc.

4 units (Moeller-Sally) not given 1997-98

100. History of Russian Music—Introduction to Russian culture through the medium of Russian music, discussed in the context of Russian literature, painting, and societal life. Main periods, styles, and major figures in the history of Russian musical culture of the 19th (Glinka, Tchaikovsky, Borodin, Mussorgsky) and 20th century (Rachmaninov, Scriabin, Stravinsky, Prokofiev, Shostakovich, and contemporary composers); various genres of orchestral, instrumental and vocal music, opera, and ballet. The relationship of Russian musical culture and European musical schools. The role of the oriental traditions, themes, and elements (Jewish, Georgian, Persian, etc.) in Russian classical music. Distinct features of Russian performers (Chaliapin, Rachmaninov, Heifetz, Horowitz, etc.

3 units (Fleishman) not given 1997-98

110. Russian “Crash” Course—For students taking the Intensive Language Course in Moscow. Overview of the Cyrillic alphabet and grammar and an introduction to Russian life and manners: How does one get from Point A to Point B on the subway? What is the polite way to refuse yet another portion, etc.

1 unit, Spr (Schupbach)

119Q. Stanford Introductory Seminar: Russian Life, Language, and Culture—Preference to sophomores. For students who study or intend to study Russian language and literature, or plan to travel in Russia. Introductory culture may accompany department language and literature courses. Focus is on the forces that shaped Russian behavior and the Russian character—geography, history, religion, and culture. Students study the essentials necessary to behave appropriately in most everyday situations.

2-3 units, not given 1997-98

141. The Culture of Modern Russia: Between Empire and Nation-State, 18th and 19th Centuries

not given 1997-98

142. The Culture of Modern Russia: Between Empire and Nation-State, 20th Century

not given 1997-98

143/243. Early Russian Art and Architecture, 1050-1725—The emergence of a Muscovite Russian synthesis in art and architecture, deriving from the cultures of Byzantium and Kievan Rus', and combining Russian regional schools and village traditions; oriental and Western influences. The ecclesiastical origins and purposes of medieval Russian art and architecture. The evolution of Muscovite art/architecture in the 17th century under the impact of secularization and Westernization, culminating with the reign of Peter the Great.

4 units, not given 1997-98

144/244. The Art and Architecture of Imperial and Soviet Russia—The founding and evolution of St. Petersburg, the influence of W. European art/architecture in Imperial Russia, the search for “Russianness” (the Itinerants, Social Realism, Medieval Slavic Revival), avant-garde art and politics from 1905-1935, the triumph of Socialist Realism in the Stalinist 1930s. Slide-illustrated.

4 units, not given 1997-98

145/255. Transitions: Chekhov, the Modern Short Story, and Modern Drama—Chekhov’s art in its Russian and European literary, historical, philosophical, and political contexts. Readings of short stories and major plays (The Seagull, Uncle Vanya, Three Sisters, and The Cherry Orchard) illuminate Chekhov’s pivotal role in the development of these literary forms. Supplemental readings from Joyce, Maupassant, Tolstoy, Ibsen, and Mansfield.

4 units, not given 1997-98

156. Nabokov and Modernism—Stories, novels, and memoirs from Nabokov as a prose writer. The contemporary context of other modernist writers (Proust and Joyce) and media (film), and 20th-century social factors and intellectual discourses (Freud), whose influences Nabokov belittled or ignored. Critical approaches that elude the author’s

4 units, not given 1997-98

157. Being and Time in the Novels of Milan Kundera—(Same as Humanities 194M.) Critical analysis of Milan Kundera's art and philosophy of the novel as represented by The Joke, Life is Elsewhere, The Book of Laughter and Forgetting, The Unbearable Lightness of Being. Discussion/supplementary readings in philosophy, theory, and literature on topics such as memory, the mind-body problem, eternal recurrence, the modern. (WIM)

5 units, Aut (Moeller-Sally)

161/261. Poetess: The Grammar of the Self when the Poet is a Woman—Individual strategies of "entry" into the lyrical (intimate-turned-public) "space," distribution of roles and modes of address, the legacy of tropes, and poetic lexicon shaped by a national male tradition. How does the female poet switch from object to the subject of poetic language and its repetitive narratives? Does the cross-over from silence (or domestic arts) into cultural authority symbolically change her "gender?" Readings in Emily Dickinson, Anna Akhmatova, Marina Tsvetaeva, Sylvia Plath, and Elizabeth Bishop, with theoretical, sociological, linguistic, psychoanalytical, and feminist background readings by Felman, Kristeva, Gilbert and Gubar, Terry Castle, Svetlana Boym, Laura Engelstein, Elaine Scarry, etc. Slavic students read Akhmatova and Tsvetaeva in Russian. Graduate students enroll for a unit or more of additional supervised work on the latter. GER:3a, 5A,5B,5C. Advanced Polish

4 units, not given 1997-98

5A,5B,5C Beginning Polish

4 units, Aut, Win, Spr, not given 1997-98

6A,6B,6C. Intermediate Polish

4 units, Aut, Win, Spr, not given 1997-98

7A,7B,7C. Advanced Polish

4 units, Aut, Win, Spr, not given 1997-98

50. Review of Russian Grammar: Repair Russian—Overviews of essential Russian grammar presented in a communicative way. Discussions of Russian culture and the Russian view of reality. Extra hour of pronunciation and spoken practice available. 3-5 units (Radivilova, Staff)

5A,5B Beginning Russian

3 units, not given 1997-98

190. Modernism and the Humanities: Tolstoy's Anna Karenina and the Social Thought of its Time—A "slow reading" of Anna Karenina in its historical and cultural context. An exploration of modernity and modernization of the late 19th century in its clash with tradition (truth and philosophy, authority and legitimacy, the institution of family, sex and gender, individualism, class and estate society, capitalism and the city, autonomy of art, art and ethics). Modernity and tradition, as they appear in the novel, are examined in terms of their cultural "codes" (Clifford Geertz's cultural anthropology). Tolstoy's novel is confronted with major currents in the social thought of its time: Karl Marx on class and history; John Stuart Mill on sex equality; Friedrich Nietzsche (along with Dostoevsky and Lev Shestov) on morality, imagination, and power; Sigmund Freud on desire and the unconscious; Emile Durkheim on the sociology of religion; and Max Weber on status, legitimation, and authority.

5 units, not given 1997-98

198A. Stanford Introductory Seminar: Yugoslav Cinematography—Preference to sophomores. Understanding European cinematography by focusing on Yugoslav film. Symbolism, the selection of topics, Yugoslav values, and hidden political messages. Issues in production, distribution, and social problems: how Yugoslav films reach the domestic and foreign public, and obtaining funds for projects. Comparisons between American and Yugoslav cinematography. Does the Yugoslav film still exist?

2 units (Bojic) not given 1997-98

UNDERGRADUATE AND GRADUATE LANGUAGE

By special arrangement with the department, courses numbered 100-159 can be taken for graduate credit. Students are urged to take all three quarters of first-, second-, and third-year language series consecutively in the same academic year.


3-5 units (Radivilova, Staff)

5A,5B,5C Beginning Polish

4 units, Aut, Win, Spr, not given 1997-98

6A,6B,6C. Intermediate Polish

4 units, Aut, Win, Spr, not given 1997-98

7A,7B,7C. Advanced Polish

4 units, Aut, Win, Spr, not given 1997-98

50. Review of Russian Grammar: Repair Russian—"Mainstreams" the skills of students who do not fit easily into the basic language program, e.g., those whose performance on the Placement Exam is not sufficient to justify placement in 51, or native speakers of the language whose reading and writing skills are impaired, etc. Students successfully completing 50 normally proceed directly into 52; others, particularly "heritage" speakers enter 112 or 178.

3 units, Aut (Schupbach)

5A,5B,5C Review of Russian Grammar: Repair Russian

5 units, not given 1997-98

51.—Grammar is presented through well-known short stories by the leading 19th- and 20th-century Russian writers.

5 units, not given 1997-98

52.—See 51.

5 units, Win (Greenhill)
53.—Language practice is based on the history of Russia. 
5 units, Spr (Greenhill)

52B. Second-Year Russian—For students returning from the Overseas Studies Program in Moscow. 
5 units, Win (Schupbach, Greenhill)

111,112,113. Third-Year Russian 
111.—Emphasis is on grammar, writing, and conversation. Readings are from an edited version of the *The Golden Calf* (I' jia 1'f and Evgenij Petrov), a humorous and “right-on” view of the Russians at their best and worst. 
4 units, Aut (Schupbach, Greenhill)
112.—See 111. 
4 units, Win (Schupbach, Greenhill)
113.—Continues the emphasis of 111/112 with new material from Nikolai Gogol’s play, *The Inspector General*, and its performances on video. 
4 units, Spr (Moeller-Sally)

115. Humor and Russian Literature—The history of Russian literature from the standpoint of the humor that it contains, from Old Russian times to the present. Lectures are in English and may be taken separately from the discussion sections (in Russian). 
2-4 units, Spr (Schupbach, Greenhill)

117A,B,C. Russian for Native Speakers—“Self-paced,” for students who have grown up in Russian-speaking homes, perfecting reading and writing skills in Russian, and the ability to communicate in formal and informal settings. Supports students in retaining and enhancing their existing abilities. 
1-3 units, Aut, Win, Spr (Radivilova)

118A. Business Russian for Beginners—For those who foresee business dealings or trade negotiations in Russian. Covers the language necessary in such business situations as introducing yourself or your company; negotiating contracts; discussing advertising, insurance, and banking services; dealing with customs and government departments; renting an office; installing communication systems; and “survival” situations (ordering in a restaurant or making travel arrangements). 
1-3 units, Aut (Greenhill)

119A. Technical Translation—Problems of translation of the technical language are discussed against the background of contemporary texts on geology and geophysics. 
(Schupbach) not given 1997-98

119B. Bellettristic Translation—Focus is on the “voice” of a variety of 20th-century authors including Gorkij, Solzhenitsyn, and Bulgakov. 
(Schupbach) not given 1997-98

120. Advanced Russian for Students of the Physical Sciences, Mathematics, and Engineering—Develops reliable reading skills in the Russian technical language, emphasizing mathematics and the physical sciences. 
1 unit, not given 1997-98

ADVANCED UNDERGRADUATE AND GRADUATE LANGUAGE AND LITERATURE

129/229. Poetry as System: Introduction to Theory and Practice of Russian Verse—The relationship between Russian language and verse. The survey of verse forms employed by Russian poets from the 17th to the 20th century. GER:3a (DR:7) 
4 units, Win (Fleishman)

177,178,179. Fourth-Year Russian—Theme-based sequence: “Americans through the eyes of the Russians, Russians through the eyes of the Americans, and Russians about Russians.” Goal is the development of speaking and reading skills, built around current texts (newspaper articles, interviews, films, selections from prose fiction, TV programs, etc). Emphasis is on the common difficulties encountered by English-speaking American learners of Russian. Topics: Russian proverbs, gestures, and folklore, etc. 
3 units, Aut, Win, Spr (Radivilova)

181,182,183. Fifth-Year Russian 
181.—See 187. 
3 units, Aut (Fleishman)
182.—Focuses on the Russian language as presented in Russian/Soviet cinema. 
3 units, Win (Greenleaf, Greenhill)
183.—Combines journalism with an overview of Russian spirituality from religion to post-Soviet rock. 
3 units, Spr (Arkhipov)

185/285. Writing Russian in the Age of Catherine the Great—The Enlightenment’s boldest experiment: Catherine the Great’s use of western “regimes of description” (textual and visual) to imagine a legal Russian state, interactive public sphere and literary culture, and the parameters of the Russian subject’s interior domain. Catherine’s own writings, from Shakespearean comedies at the heart of her conception of a national theater, to her fantasy-impersonations of Europe’s ideal monarch and her boundary-crossing *Authobiography*. Readings in the original Russian or French, or English. 
4 units, not given 1997-98

186. 18th-Century Russian Literature—18th-century literature in Russia evolved from a barely appreciated didactic tool to a major force for the expression of a wide variety of social and cultural ideals. The aesthetic development of 18th-century literature and the gradual rise of its socio-political function. Emphasis is on the aspects of 18th-century Russian literary culture that paved the way for the age of Pushkin. 
4 units, not given 1997-98
187. Russian Poetry of the 18th and 19th Centuries—(Same as 181.) Required of all majors in Russian language and literature; open to undergraduates who have completed three years of Russian, and to graduate students. Major poetic styles of the 19th century as they intersected with late classicism, the romantic movement, and the realist and post-realist traditions. Representative poems by Lomonosov, Derzhavin, Zhukovskii, Pushkin, Baratynskii, Lermontov, Tiutchev, Nekrasov, Fet, Soloviev. Lectures/discussions in Russian. GER:3a (DR:7)
4 units, Aut (Fleishman)

188. From Alexandr Blok to Joseph Brodsky: Russian Poetry of the 20th Century—Required of all majors in Russian literature. Developments in Russian poetry of the 20th century including Symbolism, Acmeism, Futurism, and literature of the absurd from Zinaida Hippius and Andrey Bely to Marina Tsvetaeva and Joseph Brodsky. Emphasis is on a close reading of individual poems. Discussions in Russian. GER:3a (DR:7)
4 units, Spr (Fleishman)

189/289. Literature of Old Rus' and Medieval Russia—From the earliest times through the 17th century. Lectures on the development of literary and historical genres and on links between literature and art, architecture, and religious culture. Readings in English. Graduate students read in the original.
4 units, not given 1997-98

191. Grammatical Categories of Russian—Case, gender, number in the noun and aspect, tense, voice, mood, prefixation and transitivity in the verb. Comparisons between the Russian and English systems.
3 units, not given 1997-98

192. Russian Oral Tradition
4 units, not given 1997-98

193. The Orthodox World—Introduction to the history, spirituality, and religious culture of Eastern Christian peoples, emphasizing Orthodox theology and spirituality, comparing and contrasting it with that of the Western Church. GER:3a (DR:7)
3 units, Spr (Arkhipov, Kollman)

193A/293A. Temple and Poem: The Birth of Medieval Poetry from the Rites of Synagogue and Church—The roots of medieval poetry in the traditional techniques of reading, translating, interpreting, and preaching the Bible in ancient Synagogue and Church. History, theology, poetics, and the structure of Jewish and Christian liturgy. Genres, topics, and techniques of liturgical poetry and preaching. The structure and style of Church (mostly Eastern) and Synagogues music and chant. Primary documents from 3rd-12th centuries (Hebrew, Greek, Latin, Syriac, Slavic, mostly in English translation) and new studies of ecclesiastic poetry and music in Judaism and Christianity.
4 units, not given 1997-98

194/294. Demonology in Russian and other Slavic Cultures—Cultural, anthropological introduction to popular demonological beliefs, focusing on Russian culture. Popular practices, myths, rituals, texts, and their uses in medieval and modern Russian culture.
4 units, not given 1997-98

3 units, not given 1997-98

196. Advanced Topics in Russian Grammar II: Morphology and Syntax—Problems in government and agreement: verbs, prepositions, quantifiers, and adjectives. Lectures with coordinated exercises. Students not possessing a solid control of Russian morphology must take remedial work. Recommended: at least two years of college Russian or the equivalent.
3 units, not given 1997-98

197. Advanced Topics in Russian Grammar III 3 units, not given 1997-98

197A/297A. Comparative Grammar of Russian and West Slavic Languages—Comparative grammar and the development of practical skills for using Russian as a tool for understanding Czech, Polish, Slovak, Ukrainian, and other W. Slavic languages.
4 units, not given 1997-98

198. Comparison of Russian and English—The ways in which these two languages are similar and different. Starting from Old English and Old Russian, what events have led to their present structures and interaction.
3 units (Schupbach) not given 1997-98

198D,E,F. Slavic Languages through Russian: Bulgarian, Czech, and Serbo-Croatian—Students develop reading and grammar skills in Bulgarian, Czech, or Serbo-Croatian through Russian. Prerequisites: completion of three years of Russian, consent of instructor.
1-3 units, Aut, Win, Spr (Arkhipov)

199. Individual Work—Open to Russian majors or students working on special projects. May be repeated for credit. Prerequisite: consent of instructor.
1-5 units, any quarter (Staff)

200. Proseminar in Literary Theory and Study of Russian Literature—Required of first-year graduate students in Slavic. Introduction to graduate study in Slavic languages and literatures. Discussion of the profession, discipline, and literary theory.
complement theoretical readings and practical exercises in versification and narrative analysis.

4 units, Aut (Moeller-Sally)

200A. Slavic Bibliography—Familiarizes students with major Western language sources and search methodologies pertaining to the Russian and Eastern European area studies. Recommended: knowledge of Slavic languages.

3 units, Win (Zalewski)

206A. Colloquium on Russian Language Teaching Methodology—Overview of the historical changes that have made Russian grammar what it is today and a survey of the Slavic languages from the standpoint of Russian. Teaching methods and strategies in the Russian language classroom. (AU)

1-2 units, Aut (Radivilova, Schupbach)

206B. Colloquium on Russian Language Teaching Methodology—Continuation of 206A. (AU)

1-2 units, Win (Radivilova)

206C. Colloquium on Russian Language Teaching Methodology—Continuation of 206B. (AU)

1-2 units, Spr (Radivilova)

207A, B, C. Advanced Polish—For graduate students.

4 units, not given 1997-98

207D. Preparatory TA Training—Designed to prepare department’s TAs for teaching Russian language.

3 units, Spr (Schupbach, Radivilova)

207E. The Learning and Teaching of Second Languages—(Enroll in German Studies 201.)

3-5 units, Aut (Bernhardt)

211. Introduction to Old Church Slavic

4 units, Aut (Arhhipov)

212. Old Russian and Old Church Slavic

4 units, Win (Arkhipov)

213. History of the Russian Literary Language—Major structural and semantic changes from the 10th to the 19th centuries. Prerequisites: 211, 212.

4 units, Spr (Fleishman)

214. Biblical Apocrypha and Pseudepigrapha

4 units, not given 1997-98


4 units, not given 1997-98

222. Early Soviet Prose: Osip Mandelstam, Isaak Babel, and Mikhail Zoshchenko—These three writers in the literary, social, and historical context of the decade following the 1917 Revolution.

4 units, not given 1997-98

223A, B. Graduate Seminar: Russian Literature and the Literary Milieu of the NEP Period—The Problem of Authorship (1921-1928)—Texts (primarily journal fiction and criticism) deal with the problem of authorship and are examined in the contemporary literary and socio-historical context. Emphasis is on non-Party authors (Babel, Eikhenbaum, Mandelstam, Olesha, Tynianov, Zamiatin, and Zoshchenko).

3 units, not given 1997-98


3 units, not given 1997-98

227. Boris Pasternak and the Poetry of the Russian Avant Garde—Pasternak’s work is examined within a broad cultural context to identify and analyze characteristic features of the Russian avant garde poetry.

4 units, not given 1997-98

230C. 20th-Century Russian Literary Theory from Symbolism and Formalism to Semiotics—Survey of Russian theoretical works on literature. Scholarships of Alexander Vesebovsky, Potebnya; theories of Symbolism and Formalism. Symbolist authors (Belyi, Blok, Bryusov, Vyacheslav Iv. Ivanov) are seen in the fusion of their theoretical and poetical work as the Formalists’ school is understood in its correlation to post-Symbolist (Futurists and Acmeists) poetical movements. Postformalist studies of the 30s and 40s (Bakhtin, Florensky, Frejdenberg, Polivanov, Propp, etc.) in their relation to contemporary studies of the Prague Circle and later Moscow-Tartu semiotics school.

4 units, not given 1997-98

235. Akhmatova and Tsvetaeva

4 units, not given 1997-98

240. Soviet Culture/Soviet Civilization—Sequel to 223. Seminar on the culture of the Soviet era from the late 1920s to the death of Stalin. Literature and institutions, cultural expressions and pattern formation including other arts (film, painting, architecture), everyday life, mass/popular culture, civil religion, and varieties of Soviet citizenship. Theoretical perspective for the study of a national culture; relevant scholarship; and contemporary primary texts in a variety of genres and media.

4 units, not given 1997-98

270. Pushkin—Pushkin’s major poems and prose accompanied by detailed examination of his cultural milieu. Emphasis is on essential changes in the
270B. Pushkin in the Romantic Context—Open to students from comparative and other literatures, including advanced undergraduates. The ways Pushkin used current European aesthetic and literary discourses to fashion and refashion autoportraits in ironic and dynamic interaction. A theoretical and comparative textual framework is derived from comparative literature's study of Romanticism, integrating a variety of perspectives. Topics: the “fragment” as the quintessentially modern poetic genre; the morbid elegy as the “genre of entry” for young poets; the real narrative innovations of Byronism; Russian male “identity” and disempowerment through the Oriental erotic tale; Pushkin’s use of Shakespeare’s chronicle plays to rewrite Karamzin’s history of Boris Godunov; his renovation of Gothic conventions for Russian uses; the ability of the concept “Romantic irony” to shed new light on *Eugene Onegin*, “Egyptian Nights,” and Pushkin’s relation to Romanticism.

4 units, not given 1997-98

272. Mandelstam and the Modernist Paradigm—His poetry, prose, critical writings, and reception in the context of contemporary letters, scholarship, and politics. The function of poetry in Modern Russian culture. Mandelstam’s Acmeist paradigm in Soviet civilization.

4 units, not given 1997-98

277. Gogol and Russian Culture in the 1830s—Open to advanced undergraduates with consent of instructor. The writings of Nikolai Gogol against the background of the paradigmatic shifts in literary art, philosophy, and cultural institutions in 1830s Russia. Possible topics: the status of prose, economy and literature, orality and literacy, nationalism, historical narrative. Readings in the original Russian.

4 units, not given 1997-98

278. Tolstoy—Open to exempt undergraduates. Tolstoy’s creative evolution from his early and late short fiction (*Childhood, The Sevastopol Tales*, and *The Kreutzer Sonata*, etc.) and nonfiction (*Confession* and *Anna Karenina*, together with the appropriate critical texts. Readings in Russian.

4 units, not given 1997-98

279. Dostoevsky—The writer’s shorter works in the context of European thought and literature.

4 units, not given 1997-98

299. Individual Work—For graduate students in Slavic working on theses or engaged in special work. Prerequisite: written consent of instructor.

1-12 units, any quarter (Staff)
SCHOOL OF HUMANITIES AND SCIENCES

ground for students considering careers in the professions or business. Students may pursue degrees in sociology at the bachelor's, master's (coterminal), or doctoral levels.

UNDERGRADUATE PROGRAMS

Sociology offers two programs leading to the A.B. degree: the general sociology major and the specialized major. Both are designed around a core curriculum, the intent of which is to ensure adequate coverage of basic sociological knowledge and to provide enough flexibility for tailoring the degree program to fit individual needs and interests. The general major consists of the core curriculum plus a selection of additional courses intended to provide breadth of exposure to the variety of areas encompassed by sociology. The specialized major consists of the core curriculum plus a concentrated set of courses in one area of sociology. Areas of concentration include Social Psychology and Interpersonal Processes, Organizational Studies, Social Stratification and Inequality, and Political and Comparative-Historical Sociology. If a specialized major is completed, the student's transcript will reflect his or her specialized field of study. These programs and the requirements for each are described below.

CORE CURRICULUM AND GENERAL SOCIOLOGY MAJOR

All recipients of the A.B. degree in Sociology must complete a minimum of 60 units of course work in the major. All courses taken to satisfy this 60-unit requirement must be taken for a grade of 'C-' or better (except for Sociology 190-193). Related course work from other departments may fulfill part of this requirement, but such work must be approved in advance by a department adviser and must not exceed 15 units. All degree candidates must fulfill the following core requirements:

1. Introduction to Sociology (1). It is recommended that students take it early in their program.
2. Methods for Sociological Research (180), or its equivalent.
3. An introductory course in statistics, such as Sociology 181B, Statistics 60, Psychology 60, or equivalent.
4. Classics of Modern Social Theory (170), or an equivalent course in social theory.
5. At least three foundation courses, each from a different area of concentration.
6. Senior Seminar for Majors (200), to be taken by majors during their senior year.

To complete the general Sociology major, the student must complete 25 additional units of work, up to 15 units of which may be related course work in other departments.

SPECIALIZED SOCIOLOGY MAJOR

The department recognizes that some students may wish to engage in more in-depth study than that provided by the major in general Sociology. The specialized Sociology major permits students to pursue a more focused program in one of the four areas of concentration described below. To complete the requirements for the A.B. degree in Sociology with a field designation in Social Psychology and Interpersonal Processes, Organization Studies, Political and Comparative-Historical Sociology, or Stratification and Inequality, the student must (1) complete all the core and foundation curriculum, and (2) complete 20 units of course work in the selected area of concentration.

CONCENTRATION AREAS

Each area identifies a specialized arena of inquiry, a set of skills within sociology, and basic preparation for a variety of careers. A brief description of each area follows.

Social Psychology and Interpersonal Processes—This area of inquiry focuses on the social organization of individual identity, beliefs, and behavior; and upon social structures and processes which emerge in and define interpersonal interactions. Processes studied include social acceptance and competition for prestige and status, the generation of power differences, the development of intimacy bonds, the formation of expectation states which govern performance in task oriented groups, and social pressures to constrain deviance. Foundation courses emphasize the effect of social processes on individual behavior and the analysis of group processes. This area provides excellent training for careers having a significant interpersonal component, including law, management, business, advertising and marketing, medicine and health, education, or social work.

Organizational Studies—This area studies individual behavior within organizations and the behavior of organizations as collective actors, and the factors that affect them. Organizations are the primary tool by which specialized goals are pursued in modern societies; they are found in every sector of modern life. Organizations studied include private profit-making firms and public organizations; voluntary associations and total institutions such as prisons; and small, single purpose companies as well as giant diversified corporations. Foundation courses stress the environmental and technological factors that shape the structure of organizations and the social psychological and interpersonal processes that shape the behavior of individuals within organizations.
Careers related to this study include all areas of management and administration; public, business, education; management consulting and analysis; and organizational development.

**Social Stratification and Inequality**—This area offers a comprehensive overview of various forms of social inequality. It examines the shape and nature of social inequalities; the competition for power; the allocation of privilege; the production and reproduction of social cleavages; and the consequences of class, race, and gender for such outcomes as attitudes, political behavior, and lifestyles. Many courses emphasize changes in the structure of social inequalities over time, and the processes which produce similarities or differences in stratification across nations. Topics include educational inequality, employment history, gender differences, income distributions, poverty, race and ethnic relations, social mobility, and status attainment. Careers related to this field include administration, advertising, education, foreign service, journalism, industrial relations, law, management consulting, market research, public policy, and social service.

**Political and Comparative-Historical Sociology**—This area encompasses the study of the emergence, persistence, and dissolution of political and economic institutions within nation-states. Evolutionary, institutional, structural, and comparative perspectives encourage students to think about why different forms of nation-states, citizenship incorporation, and economic distribution exist. Foundation courses introduce students to the relationships among economic diversity, distribution, and political transitions such as social movements, revolutions, and nationalist secession movements. Processes such as the development of markets and transition to market economies and political democracies are also a focus. Careers related to this area include law, government service, and national and international business applications.

**CONCENTRATION AREA COURSES**

Many of the department courses can be categorized as primarily oriented to one of the four areas of concentration; a few courses are relevant to more than one area. Within each area of concentration, one or more undergraduate foundation courses are identified which provide a general introduction to the area or some portion of it. Courses, classified by area, are as follows:

1. **Social Psychology and Interpersonal Processes**
   - Foundation Courses: 120, 121
   - Other Courses: 132, 142, 150, 220-229

2. **Organization Studies**
   - Foundation Course: 160
   - Other Courses: 110, 130, 161-169, 260-269

3. **Social Stratification and Inequality**
   - Foundation Course: 140

4. **Political and Comparative-Historical Sociology**
   - Foundation Courses: 110, 114, 130
   - Other Courses: 111-119, 133, 138, 210-219, 230

**MINORS**

The minor in Sociology is intended to familiarize students with the basic concepts and methods of the discipline. In addition to ensuring considerable breadth of exposure to the fundamental issues and approaches of the field of sociology, students are encouraged to obtain some depth of exposure to one of the specialized areas of study.

The requirements for a minor in sociology are as follows:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sociology 1: Introduction to Sociology</td>
<td>5</td>
</tr>
<tr>
<td>Sociology 180: Methods for Sociological Research</td>
<td>5</td>
</tr>
<tr>
<td>Two Foundation Courses, one each from two of the four concentration areas (e.g., Social Psychology; Organizations; Stratification; Comparative-Historical Sociology)</td>
<td>10</td>
</tr>
<tr>
<td>Additional course work in the department, preferably in the Areas of Concentration associated with the Foundation Course taken (consult listing of courses for each area described elsewhere in the Bulletin)</td>
<td>15</td>
</tr>
<tr>
<td>Total course work required</td>
<td>35</td>
</tr>
</tbody>
</table>

All courses qualifying for the minor must be taken for a letter grade and receive a grade point average (GPA) of 'C-' or higher.

**HONORS PROGRAM**

Students desiring to undertake an independent scholarly project under the direction of a faculty member are encouraged to apply for admission to the department's honors program. To enter the program, the student must be accepted by a faculty member of the department who agrees to advise on the research and writing of the essay. It is possible in some cases for students to work with faculty advisers in other departments, but such arrangements must be approved by the chair of the Undergraduate Studies Committee. Admission to the program requires a GPA of 'B+' or higher in courses taken within the major, and an overall GPA of 'B' or higher in all undergraduate course work.

Work on the project can begin earlier, but ordinarilı is initiated in connection with meeting the course requirements of Sociology 200, Senior Seminar for Majors. Students are encouraged to begin designing their honors project in connection with this seminar, in consultation with the seminar leader and a faculty member who is willing to serve as sponsor for the honor’s project. If admitted to the program, the work can then be completed during Winter and Spring Quarters.
To formally enter the program, a student must complete an application form from the department office. The form requires the endorsement of the faculty sponsor and is to be accompanied by a brief description of the project to be undertaken and a copy of the student’s undergraduate transcript. Prospective candidates must submit the copy of the completed application to the chair of the Undergraduate Studies Committee no later than the end of the third quarter before graduation (typically Autumn Quarter of the senior year).

Honors students may earn up to 12 units credit for work leading to completion of the required honors thesis (excluding units associated with the Senior Seminar). To be eligible for an honors degree, a grade of ‘A-’ or better must be earned on the honors thesis. If an ‘A-’ is not earned, the thesis credit counts toward meeting the standard major requirements.

Successful completion of honors in Sociology requires (1) completion of all requirements for the major; and (2) completion of a thesis of honors quality (a grade of ‘A-’ or higher). The thesis is due on or before the beginning of End-Quarter period in the student’s final quarter before graduating. If the thesis has been sponsored by a faculty member outside the department, it must be submitted to both that sponsor and to the chair of the Undergraduate Studies Committee, who appoints a departmental reader to evaluate the paper. Both the sponsor and the reader must agree that the paper merits honors. In every case, two copies of the final paper must be submitted. One is retained by the department and becomes a part of the department’s permanent collection.

COTERMINAL MASTER’S PROGRAM

Stanford undergraduate students who wish additional training in sociology (whatever their undergraduate major), and who have a good academic record (ordinarily a GPA of at least ‘B+’ in their previous undergraduate work), may apply to the coterminal master’s program as described in the “Undergraduate Degrees” section of this bulletin.

To apply for admission to the coterminal program, students should submit with the coterminal application the following: (1) a statement of purpose providing the rationale for the proposed program of study, (2) a proposed program that specifies at least 45 units of course work relevant to the degree program and at least 36 units in Sociology, (3) a current undergraduate transcript, and (4) two letters of recommendation from Stanford faculty familiar with the student’s academic work.

All 45 course units to be counted toward the graduate degree must be at or above the 200 level; at least 18 course units must be above the 200 level. Because the acquisition of research skills is an important component of graduate training in the social sciences, it is recommended that coterminal students take one or more research methodology courses, for example, Sociology 281A and 281B. A grade of ‘B-’ or better must be secured in each course satisfying the 45-unit requirement.

Most coterminal students propose programs that concentrate on one of the four specialized areas of study offered by the department: Social Psychology and Interpersonal Relations; Organization Studies; Political and Comparative-Historical Sociology, or Stratification and Inequality. This approach helps to ensure program coherence.

GRADUATE PROGRAMS

Admission—Applicants to the graduate program should have some undergraduate preparation in sociology; however, the department does consider for admission those without such preparation. Each applicant must submit results from both the quantitative and the verbal tests of the Graduate Record Examination. The GRE Advanced Tests in Sociology may be taken, but it is not mandatory. In addition, foreign students must take the TOEFL exam (a minimum score of 600 is required by the University to be considered for admission), and the TSE (Test of English as a Spoken Language). Admission forms can be obtained from Graduate Admissions, Registrar’s Office, Old Union, Stanford University, Stanford, CA 94305-3005. Completed forms should be returned to the Department of Sociology. Students are admitted once each year for graduate study beginning in the Autumn Quarter. The University deadline for receiving applications for admission is January 1.

MASTER OF ARTS

Ordinarily, the department does not admit students who are candidates solely for the A.M. in Sociology. This degree is, however, granted as a step toward the fulfillment of Ph.D. requirements. To receive the A.M., 45 units of approved work must be completed with a grade point average (GPA) of ‘B-’ or better. All course work must be at 100 level or above; 18 units must be above the 200 level.

Students enrolled in business, education, law, medicine or any other advanced degree program at Stanford may wish to obtain a master’s degree in Sociology. In this instance, the usual admission requirements are waived, but course requirements are determined in consultation with the Sociology adviser for doctoral candidates from other departments and schools. All 45 units must be taken in Sociology courses at Stanford. Interest-
ed students should contact the department for advance approval of their programs.

DOCTOR OF PHILOSOPHY

The department admits only those students who show potential for admission to Ph.D. candidacy. For the first three quarters of residence, all students have probationary status. At the end of this period, the department's faculty review the academic progress of each student. Possible outcomes of this review include (1) removal from probationary status, (2) continued probationary status for an additional period, or (3) termination from the program. In the sixth quarter of residence, the faculty decide whether the student should be admitted to Ph.D. candidacy. Admission implies that the student's position in the department is secure, subject only to continued satisfactory progress toward completion of remaining department and University requirements.

A student who is admitted to Ph.D. candidacy must satisfy the following department requirements:

1. Complete a research apprenticeship for three quarters in a faculty research program. At least one of these three quarters must be completed within the first 12 academic quarters (including summers). The remaining work must be completed before the end of the fourth year in residence.

2. Complete a teaching apprenticeship for three quarters under the supervision of a faculty member.

3. Complete five required graduate foundation courses, one in each of four areas of specialization: Political and Comparative-Historical Sociology (310, and either 210 or 214 or 218), Social Psychology (320), Stratification (340), and Organization Studies (360). These broad courses provide an analytic and rigorous introduction to each area. At least four foundation courses must be completed in the first year of graduate study, and the fifth foundation course must be completed by the end of the second year.

4. Develop a thorough grounding in sociological theory and research methods. Students with little background in statistics are encouraged to take Sociology 281B (or equivalent) as soon as possible after entering the department. Methodology courses (382, 383, 384) are required of all students, as is 281A in Autumn Quarter. All students are also required to take Sociology 372, Theoretical Analysis and Design, focusing on the structure of sociological theory, strategic choice of methods, and the relation of theory to data.

5. Complete a publishable paper by the end of the first quarter of the third year. This paper may be on any sociological topic, and may address theoretical, empirical, or methodological issues. These third-year research papers are evaluated by a two-person committee: one primary adviser and one secondary adviser/reader. Students invite faculty members to serve in this capacity; at least one of the committee members must be a regular faculty member of the department. The Graduate Studies Committee (GSC) must approve all proposed committees.

6. Write a dissertation prospectus and pass the University oral examination. The oral exam is intended to evaluate the dissertation prospectus.


Required Sociology Courses —

1. Introduction to the Discipline:
   210. Politics and Society or
   214. Economic Sociology, or
   218. Collective Action
   310. Political and Comparative-Historical Sociology
   320. Foundations of Social Psychology
   340. Social Stratification
   360. Foundations of Organizational Sociology

2. Research Methods:
   281A. Sociological Methodology IA: Computer Assisted Data Analysis
   281B. Sociological Methodology IB: Statistics (required only of students with little statistics background)
   382. Sociological Methodology II: The General Linear Model
   383. Sociological Methodology III: Advanced Models for Discrete Outcomes
   384. Sociological Methodology IV: Advanced Models for Continuous Outcomes

3. Theory, Analysis, and Research Design:
   372. Theoretical Analysis and Design

4. Additional Course Work: students must complete course work adequate to prepare them to write their third-year research paper.

Ph.D. MINOR

Sociology offers a minor for School of Education doctoral students. Students must complete a minimum of 30 graduate-level units with a GPA of "B-" or better. All 30 units for the minor are to be taken in Sociology courses or by Sociology faculty, the exception being statistics or methods courses. Research and directed reading courses are acceptable but must be approved in advance by the chair of the Graduate Studies Committee. The specific program must be approved by a Sociology adviser and filed with the Department of Sociology.

JOINT PROGRAM WITH THE SCHOOL OF LAW

The faculties of the School of Law and the Department of Sociology conduct joint programs
leading to either a combined J.D. or J.M. degree with an A.M. degree in Sociology or a combined J.D. or J.M. degree with a Ph.D. in Sociology.

Normally, the student interested in pursuing an A.M. degree in Sociology completes one full year of the law program, applying for admission to the Department of Sociology during the first year of law school. If admitted, the student must complete regular Department of Sociology master’s degree requirements. Applications for a joint program must be approved by the Research and Interdisciplinary Studies Committee of the School of Law and by the Department of Sociology. Faculty advisers from both the department and the school participate in the planning and supervise the study program of students admitted to joint degree status.

The joint J.D.-Ph.D. degree program is designed for students who wish to prepare themselves for research or teaching careers in areas relating to legal and sociological concerns. Participation requires application to both the School of Law and the Department of Sociology and acceptance by each. Upon admission, the student may elect to begin his or her study program in either the School of Law or the Department of Sociology. Normally, the student spends the first full year in one program and the second full year in the other. Thereafter, the student may take courses concurrently until requirements for both degree programs have been met.

COURSES

Courses are open to all students without prerequisites, unless specifically indicated. Courses numbered 200-299 are open to advanced undergraduate and graduate students. Courses numbered 300 and above are normally offered to graduate students only. Courses with an ‘X’ suffix are taught at an overseas campus only.

OPEN TO ALL STUDENTS

1. Introduction to Sociology—Introduces the central concepts, methods, and theoretical orientations of the discipline. Sociological imagination is illustrated by recent theory and research. Possible topics: the persistence of class cleavages; ethnic, racial, and gender inequalities; religious beliefs and the process of secularization; functions and dysfunctions of educational institutions; criminology and social deviance; social movements and social protest; production and reproduction of culture; rise of organizational society. GER:3B (DR:9)

5 units, Aut (Creighton)  
Win (Snipp)  
Spr (Freeland)

5. Status, Friendship, and Social Pressure: An Experiential Approach—(Graduate students register for 205.) The basic social processes that struc-
110. Politics and Society—(Graduate students register for 210.) Themes of political sociology, the origins and expansion of the modern state, linkages between state and society, the impact of the modern world system on national policies, internal distribution of power and authority, and the structure of political group formation and individual participation in modern states. Emphasizes modern empirical literature. GER:3b (DR:9)
5 units, Aut (Meyer)

112. Social Foundations of Democracy—(Enroll in Political Science 116L.)
5 units (Diamond) given 1998-99

114. Economic Sociology—(Graduate students register for 214.) The sociological approach to the study of production, distribution, consumption, and markets, emphasizing the impact of social structure and institutions on the economy. Comparison of classic and contemporary approaches to the economy among the social science disciplines. Topics: industrial organization, business alliances, labor markets, the role of informal networks in the production of goods and services, the allocation of goods through non-market mechanisms, capitalism in non-western societies, power relations in business, and the organization of professions such as law and medicine. Prerequisite: at least one course in economics or sociology. GER:3b (DR:9)
5 units, Aut (Granovetter)

116. Comparative Sociology: Successor States of Soviet Union—(Graduate students register for 216.) Comparative view of the problems of socialist and post-socialist societies, emphasizing the Soviet Union and nation states arising since its collapse, and China and E./Central European states. The institutional organization of society and its impact on lives of ordinary people. Work life and careers, stratification and inequality, ethnic minorities and women, family life, people’s values and beliefs under old and new “rules of the games.”
5 units, Win (Titma)

118. Social Movements and Collective Action—(Graduate students register for 218.) Contemporary research on social movements and collective action. Strategies used by researchers for collecting and analyzing information on collective events, protests, conflicts, and social movements organizations. Analysis of different theories and methods that try to account for the rise and fall of social movement activity over time. GER:3b (DR:9)
5 units, Win (Olzak)

119. Political, Social, and Economic Structures of Modern States—(Graduate students register for 219.) The basic features of the political, social, and economic structures of modern states and alternative theories of how these structures evolve and are related to one another. Case studies of major states elucidate various theories and arguments. Emphasis is on the former socialist states and their attempts to forge new political and economic structures. Comparisons of these transformations to one another and to the structures in democratic states with established markets bring many issues concerning the interdependencies of societal structures into focus.
5 units, given 1998-99

130. Education and Society—(Graduate students register for 230; same as Education 220C.) The effects of schools and schooling on individuals, the stratification system, and society. Education as socializing individuals and as legitimizing social institutions. Social and individual factors affecting the expansion of schooling, individual educational attainment, and the organizational structure of schooling. GER:3b (DR:9)
5 units, Spr (Meyer)

131. World, Societal, and Educational Change: Comparative Perspectives—(Formerly 332.) (Graduate students register for 231; same as Education 306D.) Analysis of the relations between educational and societal developments from a comparative perspective. Readings on varying theoretical perspectives and empirical studies on the structural and cultural sources of educational expansion and differentiation, and on the cultural and structural consequences of educational institutionalization. Research topics: education and nation-building; education, mobility, and equality; education, international organizations, and world culture.
5 units, Aut (Ramirez)

133. Computers and Interfaces: Psychology and Social Issues—(Enroll in Communication 169.)
4 units, Win (Nass)

136A. Law and Society—Sociological approaches to the study of law and the legal system; lectures on theoretical perspectives with examples from legal settings. Topics: central philosophical debates in the sociology of law; social-psychological foundations of legal behavior; relations between law and the economy, stratification, culture, ideology, and social change. Contemporary legal issues (crime, litigiousness, civil rights, etc.) provide opportuni-
ties to link sociological theories with current events. Prerequisite: 1.
5 units, Spr (Creighton)

138. American Indians in Comparative-Historical Perspective—(Graduate students register for 238.) Comparing historical frameworks surveys the demographic, political, and economic processes and events that shaped relations between Euro-Americans and American Indians from 1600 to 1890. How the intersection of these processes affected the outcome of conflicts between these two groups, and how this conflict was decisive in determining the social position of American Indians in the late 19th century and the evolution of the doctrine of tribal sovereignty. GER:4b (DR:3)
5 units, Win (Snipp)

SOCIAL PSYCHOLOGY AND INTERPERSONAL PROCESSES

120. Interpersonal Relations—(Graduate students register for 220.) Power, exchange, coalition formation, status, conformity, and deviance. Important traditions of research have developed from the basic theories of these processes. Emphasis is on understanding basic theories and drawing out their implications for change in a broad range of situations, families, work groups, and friendship groups. GER:3b (DR:9)
5 units, Aut (Ridgeway)

121. Social Psychology and Social Structure—(Graduate students register for 221.) Understanding the individual’s relationship to social groups, from two-person groups to society at large. Emphasis is on how social structure shapes individuals and how individuals in turn affect their social environment. Topics: identity, agency, interpersonal relations, social dilemmas, the life course, and collective behavior. GER:3b (DR:9)
5 units, Win (Bienenstock)

128. Groups, Teams, and Organizations—What makes groups productive? What is an effective group member? How does "team spirit" affect individual performance? How do organizations expand and constrain individuals? Experience with group and organizational phenomena is provided through simulation games and structured exercises. Lectures/readings provide tools for analyzing these experiences based on empirical research and theoretical ideas.
5 units (B. Cohen) given 1998-99

150. The Family—Examines American families, employing theories of social psychology to study interactions within the family and between the family and other institutions. Topics: the nature and history of the family, state regulation of families, variations by class and ethnicity, family violence, gender roles, parenting, and divorce.
5 units, Aut (Staff)

155. Children, Society, and Public Policy—Emphasizes theoretical issues, empirical studies, and policy implications. Guest lecturers. Topics related to children and youth: family structures and processes, welfare reform, poverty and inequality, education, communities, class and ethnic differences, legal issues, violence and crime, the media, and health care policy. Aim is to sensitize students to the policy issues affecting contemporary childhood and adolescence.
5 units, Spr (Staff)

SOCIAL STRATIFICATION AND INEQUALITY

132. Gender and Education—(Same as Education 170, Feminist Studies 130.) The impact of organizational and larger societal forces on the experience of men and women in educational institutions. These forces have effects on educational outcomes and on the way boys and girls relate to each other in educational settings. Emphasis is given to the evidence for bias against girls within schools, focusing on making arguments and forming policies based on research evidence.
4 units, Spr (E. Cohen)

134. Education and the Status of Women: Comparative Perspective—(Same as Education 197.) Theories and perspectives from the social sciences relevant to an understanding of the role of education in changing, modifying, or reproducing structures of gender differentiation and hierarchy. Cross-national research on the status of women and its uses to evaluate knowledge claims from varying perspectives.
4-5 units, Win (Ramirez)

139. American Indians in Contemporary Society—(Graduate students register for 239.) The social position of American Indians in contemporary American society, 1890 to the present. The demographic resurgence of American Indians, changes in social and economic status, ethnic identification and political mobilization, and institutions such as tribal governments and the Bureau of Indian Affairs. Recommended: 138 or a course in American history. GER:4b (DR:3)
5 units, Spr (Snipp)

140. Introduction to Social Stratification—(Graduate students register for 240.) Introduction to social stratification theory and research. The shape and nature of social inequalities; competition for power; allocation of privilege; production and reproduction of social cleavages; and the consequences of class, race, and gender for such outcomes as attitudes, political behavior, and lifestyles. Topics: distribution of educational opportunities and cultural capital; labor market segmentation by race, ethnicity, and gender; status attainment and occupational mobility; income inequalities and urban pov-
141. Introduction to Social Networks—(Graduate students register for 241.) Introduction to social network theory, methods, and research. Basic network concepts (e.g., density, homogeneity, and centrality) are defined and applied to a variety of substantive areas. The impact of social network structure on individuals and groups in such areas as communities and neighborhoods, families, work life, and innovations.

5 units, Win (Titma)

142. Sociology of Gender—Gender inequality in contemporary American society with different explanations for how it is maintained. The social and relative nature of knowledge and the problems this poses for understanding sex differences and gendered behavior in society. Three analytical levels of explanation for gender inequalities: socialization, interaction processes, and socio-economic processes. Arguments and evidence for each approach. The social consequences of gender inequality, e.g., the feminization of poverty and problems of interpersonal relations.

3-5 units, Win (Ridgeway)

143. Gender Stratification—(Graduate students register for 243.) Historical and contemporary patterns in gender stratification. Topics: division of labor between men and women; relationship between social class and gender; dynamics of occupational sex segregation; gender differences in social mobility, socialization, and educational attainment; racial and cross-national variations in gender inequality.

5 units, given 1998-99

145. Race and Ethnic Relations—(Graduate students register for 245.) Race and ethnic relations in the U.S. and elsewhere. Analysis of the processes that render ethnic and racial boundary markers (e.g., skin color, language, culture) salient in interaction situations. Explanations of why only some groups become targets of ethnic attacks. Analysis of the social dynamics of ethnic hostility and ethnic/racial protest movements. GER:3b (DR:9)

5 units, Aut (Olszak)

149. The Urban Underclass—(Graduate students register for 249.) Recent research and theory on the urban underclass, including evidence on the concentration of African Americans in urban ghettos, and the debate surrounding the causes of poverty in urban settings. Analysis of ethnic/racial conflict, residential segregation, and changes in the family structure of the urban poor. GER:3b (DR:9)

5 units, Spr (Olszak)

151. Assimilation or Ethnic Persistence: Asians in America—The nature of Asian-American assimilation; the extent to which Asian-American assimilation has paralleled that of white ethnic groups; the limits and possibilities of non-white assimilation; the inadequacy of current indicators of assimilation. In-class interviews of Asian-Americans from local communities.

5 units, Spr (Chow)

156. Sociology of Work—Work occupies the majority of our waking hours. The organization of work may be the most important way in which society influences our daily lives. The nature of work, its history, and its possible future.

5 units, Spr (Staff)

ORGANIZATIONAL STUDIES


5 units, Aut (Hannan)

161. Organizational Ecology—(Graduate students register for 261.) Recent research on populations of market and non-market organizations. Processes determining when new organizations emerge, what forms they assume, and how long they last. Relations between organizations and the environment, and the competitive, commensal, and symbiotic relations that tie organizations together.

5 units (Hannan) given 1998-99

165. Identity and Organizational Culture—(Graduate students register for 265.) Introduction to the study of organizational culture and identity. What are organizational cultures? What are their functions and characteristics? Can organizational cultures be managed? How do organizational cultures shape their members' identities and sense of self? How do members cope with the demands of their organizational identities? Guided by theories of culture and identity, the answers are explored in four case studies.

5 units, Spr (Staff)

166. Organizations and Public Policy—(Graduate students register for 266; same as Public Policy 102.) Concepts and methods for analyzing the influence of organizations on the setting and implementation of public policy. Varying conceptions of organizations as corporate actors and as social contexts. Roles of organizations in relation to public policy; organizations as decision makers and problem solvers, as change agents, and as clients. Pre-requisite: 160 or Industrial Engineering 100. GER:3b (DR:9)

5 units, Win (Scott)

169. Health Care in America—(Enroll in Human Biology 160.)

3 units, Aut (Barr)
SOCIOLOGICAL THEORY
170. Classics of Modern Social Theory—(Graduate students register for 270.) The enduring contributions of Karl Marx, Max Weber, and Emile Durkheim to contemporary sociology. Topics: the problem of social order and the nature of social conflict; capitalism and bureaucracy; the relationship between social structure and politics; the social sources of religion and political ideology; and the evolution of modern societies. Examples from contemporary research illustrate the enduring impact of these traditions.
5 units, Win (Walder)

RESEARCH METHODS
180A. Methods for Sociological Research—(Graduate students register for 380A.) Introduces the methods used in contemporary sociological research, focusing on strategies for designing research and analyzing data. Associated lab, see 180B.
2-3 units, Aut (B. Cohen)

180B. Methods for Sociological Research—(Graduate students register for 380B.) Lab exercises consider problems of collecting observations, constructing theory, testing hypotheses and generalizing research results. Corequisite: 180A.
2-3 units, Aut (Staff)

181A. Sociological Methods IA: Computer Assisted Data Analysis—(Formerly 183/381B; graduate students register for 281A.) For Sociology majors only. Introduction to the computer as a research tool and to common datasets in the social sciences. Emphasis is on development of the necessary skills for other courses in Sociology methodology. Enrollment limited to 15.
2 units, Aut (Staff)

181B. Sociological Methods IB: Statistics—(Graduate students register for 281B.) Emphasizes the statistical methods of principal relevance to sociology including contingency tables, correlation, and regression. Recommended: 181A/281A. GER:2c (DR:4)
5 units, Win (Staff)

FOR ADVANCED/COTERM UNDERGRADUATES AND GRADUATE STUDENTS

INDIVIDUALIZED LEARNING EXPERIENCES, PRIMARILY FOR UNDERGRADUATE MAJORS
190. Undergraduate Individual Study
1-5 units (Staff)

191. Undergraduate Directed Research—Work on a project of one's own choice under the close supervision of a faculty member. Prior arrangement required.
1-5 units (Staff)

192. Undergraduate Research Apprenticeship—Work in an apprentice-like relationship with specific faculty member(s) in an on-going research project. Prior arrangement required.
1-5 units (Staff)

193. Undergraduate Teaching Apprenticeship
1-5 units (Staff)

196. Senior Thesis—Work intensively on an honors thesis project under faculty supervision (see description of honors program). Must be arranged early in the year of graduation, or before.
1-15 units (Staff)

200. Senior Seminar for Majors—The student brings together theory, methods, and substantive courses by illustrating the ways in which sociological problems are framed, linked to theories, and answers pursued through appropriate research designs. Student project can be continued with an honors thesis. (WIM)
5 units, Win (Bienenstock)

205. Status, Friendship, and Social Pressure: An Experiential Approach—For graduate students; see 5.
5 units, Spr (Berger)

POLITICAL AND COMPARATIVE-HISTORICAL
210. Politics and Society—For graduate students; see 110.
5 units, Aut (Meyer)

213. Seminar: Institutional Theories of Nation-States and other Organizations—Reviews institutional theories and research on the impact of wider environments (including world society as a whole) on nation-state structures, and on organizational forms arising within national societies. Prerequisite: previous work in comparative or political sociology.
5 units, Spr (Meyer)

214. Economic Sociology—For graduate students; see 114.
5 units, Aut (Granovetter)

216. Comparative Sociology: Successor States of Soviet Union—For graduate students; see 116.
5 units, Win (Tinma)

217. China's Social Transformation—The implications of China's transition to a market economy for social stratification and mobility, property rights and economic organization, and political organization and authority. Provides an informed critical overview of recent scholarship and identifies promising questions for further research.
5 units, Win (Walder)
218. Social Movements and Collective Action—
For graduate students; see 118.
  5 units, Win (Staff)

219. Political, Social, and Economic Structures
    of Modern States—For graduate students; see 119.
    5 units, given 1998-99

220. Interpersonal Relations: Lectures and
    Seminars—For graduate students; see 120.
    5 units, Aut (Ridgeway)

221. Social Psychology and Social Structure—
    For graduate students; see 121.
    5 units, Win (Bienenstock)

222. Gender, Interaction, and Inequality—Seminar
    on the diverse effects of gender on patterns of
    interaction and the role of these interactional
    patterns in the maintenance of gender inequality in U.S.
    society. Empirical evidence for gender effects in
    interaction, major theoretical perspectives for explaining
    them, and the implications of these perspectives for
    analyzing gender inequality. Emphasis is on the critical
    evaluation of the theories in light of the evidence. Topics:
    power and power use, influence, social emotional behavior,
    nonverbal behavior, and language in interaction.
    5 unit (Ridgeway) given 1998-99

223. Interaction Processes in Education: Design
    and Evaluation—(Same as Education 312.) Educa-
    tional applications of sociological/social psycho-
    logical theory and research to classroom processes,
    staff relations, teams, task forces. The principles for
    design and evaluations of group-work for students
    and teamwork for teaching staff. Topics: social
    process of influence, role differentiation, and eval-
    uation. Methods of systematic evaluation and ob-
    servation. Students receive practical experience in
    using these methods.
    4 units, Aut (E. Cohen)

SOCIAL PSYCHOLOGY AND
INTERPERSONAL PROCESSES

224. American Indians in Comparative-Histori-
    cal Perspective—For graduate students; see 138.
    5 units, Win (Snipp)

SOCIAL PSYCHOLOGY AND
INTERPERSONAL PROCESSES

225. Problems in Sociology of Education—
    Graduate students register for 330; same as Ed-
    ucation 210.) Introduction to sociological ap-
    proaches to educational phenomena. Topics: school
    organization and environment, the relation-
    ship of education to adult roles, the impact of social
    class and ethnicity on classroom learning, and the
    social structure of the classroom. Read and eval-
    uate social sciences research. Short written assign-
    ments and individual feedback.
    4 units, Win (E. Cohen)

226. American Indians in Contemporary Soci-
    ety—For graduate students; see 139.
    5 units, Spr (Snipp)

227. Introduction to Social Stratification—For
    graduate students; see 140.
    5 units, Win (Titma)

228. Introduction to Social Networks—For grad-
    uate students; see 141.
    5 units, given 1998-99

229. Gender Stratification—For graduate students;
    see 143.
    5 units, given 1998-99

230. Race and Ethnic Relations—For graduate
    students; see 145.
    5 units, Aut (Olzak)

231. The Urban Underclass—For graduate stu-
    dents; see 149.
    5 units, Spr (Olzak)

ORGANIZATIONAL STUDIES

232. Problems in Sociology of Education—
    Graduate students register for 330; same as Ed-
    ucation 210.) Introduction to sociological ap-
    proaches to educational phenomena. Topics: school
    organization and environment, the relation-
    ship of education to adult roles, the impact of social
    class and ethnicity on classroom learning, and the
    social structure of the classroom. Read and eval-
    uate social sciences research. Short written assign-
    ments and individual feedback.
    4 units, Win (E. Cohen)

233. American Indians in Contemporary Soci-
    ety—For graduate students; see 139.
    5 units, Spr (Snipp)

234. Introduction to Social Stratification—For
    graduate students; see 140.
    5 units, Win (Titma)

235. Introduction to Social Networks—For grad-
    uate students; see 141.
    5 units, given 1998-99

236. Seminar in Social Networks—Advanced con-
    cepts and techniques (e.g., semigroups, block-mod-
    eling, duality, structural equivalence) in the analy-
    sis of social networks. Examples show their appli-
    cability to such topics as success in the art world,
    formation and operation of interlocking director-
    ates, behavior of children in impoverished role
    structures, and the world system. How to use net-
    work concepts and methods to analyze empirical
    data. Prerequisite: 141 or 241, or consent of the
    instructor.
    5 units (Bienenstock) given 1998-99

237. Gender Stratification—For graduate students;
    see 143.
    5 units, given 1998-99

238. Race and Ethnic Relations—For graduate
    students; see 145.
    5 units, Aut (Olzak)

239. The Urban Underclass—For graduate stu-
    dents; see 149.
    5 units, Spr (Olzak)
265. Identity and Organizational Culture—For graduate students; see 165.  
5 units, Spr (Staff)

266. Organization and Public Policy—For graduate students; see 166.  
5 units, Win (Scott)

267. Institutional Analysis of Organizations—Reading and research on the nature, origins, and effects of the modern institutional system. Emphasis is on the effects of institutional systems on organizational structure.  
5 units, Win (Scott)

268. Seminar: Technology and Organizations—The fast pace of technological development has spurred the increasing globalization of private sector organization. The constraints and opportunities that managing innovation poses for American firms. Interdisciplinary readings from economics, business, and the sociology of organizations show the importance of organizational structure, managerial decision-making, and culture to the adaptation of innovation. Theories on the process of technology transfer, diffusion of innovation, and the role of multi-national corporations and international cooperative alliances. Enrollment limited to 15.  
5 units, given 1998-99

SOCIOLICAL THEORY

270. Classics of Modern Social Theory—For graduate students; see 170.  
5 units, Win (Walder)

RESEARCH METHODS

281A. Sociological Methods IA: Computer Assisted Data Analysis—(Formerly 381A.) For graduate students; see 181A.  
2 units, Aut (Staff)

281B. Sociological Methods IB: Statistics—(Formerly 381B.) For graduate students; see 181B.  
5 units, Win (Staff)

FOR ADVANCED GRADUATE STUDENTS

GENERAL

300A,B,C. Workshop: Teaching Development—A series of workshops to prepare Sociology Ph.D. students for current and future teaching experiences. Topics: leading discussions, preparing lectures, managing classroom diversity, designing exams and grading, course design, and teaching portfolios.  
1-3 units, Aut, Win, Spr (Freeland)

POLITICAL AND COMPARATIVE-HISTORICAL

310. Issues in Political and Comparative/Historical Sociology—For sociology doctoral stu-
class,” the “underclass,” and other emerging forms of stratification under post-industrialism.

5 units, Win (Granovetter)

341A,B,C. Workshop: Social Stratification—Stratification theory and research for advanced students. Current theories and research agendas, critical reviews of recent publications, presentations of ongoing research by faculty and students. Prerequisite: registration in a Ph.D. program or consent of instructor.

1-5 units, Aut (Snipp)
Win (Staff)
Spr (Grusky)

ORGANIZATIONAL STUDIES

360. Foundations of Organizational Sociology—Core problems in the sociology of organizations, main theoretical perspectives, and research programs directed at evaluating these perspectives. Prerequisite: registration in a Ph.D. program.

5 units, Aut (Scott)

361. Seminar: Social Psychology of Organizations—(Same as Business 671R.) Selected curriculum issues in social psychology relevant to behavior in organizations. Prerequisite: consent of instructor.

5 units, given 1998-99

364. Organizations as Governance Structures—Introduction to a body of work that treats organizations as governance structures that coordinate transactions between firms while creating and maintaining cooperation within firms. In-depth reading of economic accounts of the firm (transaction cost economics, agency theory, and related approaches) and of competing explanations of governance that have emerged in the recent sociological literature.

5 units, Win (Freeland)

366A,B. Workshop on Organizational Ecology—Workshop for designing, collecting, and analysis of data on long term change in populations and communities of organizations. Prerequisites: 360, consent of the instructor.

5 units, Aut, Win (Hannan)

386. Seminar: Measurement in the Social Sciences—Principles and problems of measurement in the social sciences within the context of causal modeling. Methodological approaches, from traditional factor analysis methods to recent developments in the causal modeling of error structures. Emphasis is on the utility of multiple indicator approaches to social measurement.

5 units, given 1998-99

SOCIOLGICAL THEORY

372. Theoretical Analysis and Design—Teaches skills in theoretical analysis and the logical elements of design, including the systematic analysis of the logical structure of arguments, the relationship of arguments to more encompassing theoretical or meta-theoretical assumptions, the derivation of logical implications from arguments, assessments of theoretically significant problems or gaps in knowledge, etc.

5 units, Aut (Walder)

RESEARCH METHODS

380A. Introduction to Sociological Research—Same as 180A but restricted to Ph.D. candidates in Sociology or Sociology of Education. Associated lab, see 380B.

2-3 units, Aut (B. Cohen)

380B. Introduction to Sociological Research: Laboratory—Same as 180B but restricted to Ph.D. candidates in Sociology or Sociology of Education. Corequisite: 380A.

2-3 units, Aut (Staff)

382. Sociological Methodology II: The General Linear Model—The general linear model for discrete and continuous variables. Introduction to principles of estimation, model selection, specification error, and assessment of fit. Prerequisites: 381A,B, or equivalents.

4-6 units, Win (Tuma)


3-6 units (Tuma) given 1998-99

384. Sociological Methodology IV: Advanced Models for Continuous Outcomes—Required for the Ph.D. in Sociology. Rationale for and interpretation of static and dynamic models for the analysis of continuous variables. Topics: structural-equation models, latent-variable models, times-series models, and pooled cross-section and time-series models. Evaluation at first class meeting determines whether students have the appropriate background. Prerequisites: 381A,B, 382 and 383, or equivalents.

4-6 units, Spr (Bienenstock)


5 units (Tuma) given 1998-99


5 units (Tuma) given 1998-99
387. Seminar: Frontiers of Quantitative Sociological Research—Advanced topics in quantitative sociological research, especially recently developed models and methods. Possible topics: robust regression methods, boot-strapping, local likelihood estimation, quantile regression, two-sided logit models, event count models, event sequence models, heterogeneous diffusion models, and models for change in social networks.
3-5 units (Tuma) given 1998-99

388. Advanced Models for Analysis of Tabular Arrays—Analysis of categorical data with log-linear, log-multiplicative, latent class, latent trait, Markov, Rasch, and related models.
5 units, given 1998-99

389. Topics in Mathematical Sociology
5 units, Spr (Bienenstock)

GRADUATE INDIVIDUAL STUDY

390. Graduate Individual Study (Staff)

391. Graduate Directed Reading (Staff)

392. Research Apprenticeship (Staff)

393. Teaching Apprenticeship (Staff)

394. Thesis (Staff)

395. Research Internship—Graduate students engage in internship work and integrate that work into their academic program. Students register in the quarter following internship work and complete a research report outlining their work activity, problems investigated, key results, and any follow-up projects they expect to perform. Meets requirements for Curricular Practical Training for students on F-1 visas. Work completed cannot be counted toward the departmental research assistantship requirement.
(Staff)

OVERSEAS STUDIES

These courses are approved for the Sociology major and taught at the campus indicated. Students should discuss with their major advisers which courses would best meet educational needs. Course descriptions can be found in the “Overseas Studies” section of this bulletin or in the Overseas Studies Program office, 126 Sweet Hall.

111. Social Heterogeneity in Latin America—Santiago.
5 units, Aut (Valdés)

115W. The Left in Europe—(Same as Overseas Studies 121X.) Paris.
4 units, Win (Lazar)

117W. Social Change in Modern Britain—(Same as Overseas Studies 117W.) Oxford.
4-5 units, Spr (Davies)

145X. Race and Ethnicity in Modern Britain—(Same as Overseas Studies 111X, Political Science 111X.) Oxford.
3 units, Spr (Lustgarten)

174S. Women in Latin American Society—(Same as Overseas Studies 117X.) Santiago.
5 units, Win (Valdés)

CENTER FOR SPACE SCIENCE AND ASTROPHYSICS


Director: Peter A. Sturrock
Associate Directors: Umran S. Inan, Philip H. Scherrer, Robert V. Wagoner
Assistant Director: Roger W. Romani

Associate Professors: Bruce B. Lusignan, Peter F. Michelson
Assistant Professors: Roger W. Romani, Guenther Walther, Jeffrey Willick
Professors (Research): C-W. Francis Everitt, Philip H. Scherrer
Consulting Professors: Alan M. Title, Martin Walt

The center is an interdepartmental organization coordinating teaching and research in space science and astrophysics. Its members are drawn from the Department of Geological and Environmental Sciences in the School of Earth Sciences; the departments of Aeronautics and Astronautics, Electrical Engineering, and Mechanical Engineering in the School of Engineering; the departments of Applied Physics, Physics, and Statistics in the School of Humanities and Sciences; the W. W. Hansen Experimental Physics Laboratory, and the Stanford Linear Accelerator Center.

Research now in progress covers a wide field and is approached in a variety of ways, including experiments flown on rockets, satellites, and space probes; ground-based observations made from the Hobby-Eberly Telescope, the Wilcox Solar Observatory, and from national observatories; and
theoretical research including computer modeling. Topics currently being studied include the technical aspects of space projects such as guidance and control, planetary sciences, ionospheric and magnetospheric physics, solar-terrestrial phenomena, solar physics, stellar structure, infrared astronomy, x-ray and extreme ultraviolet astronomy, gamma-ray astronomy, high-energy astrophysics, theoretical astrophysics, gravitation theory and experiments, cosmology, and the study of life in the universe. Some of these projects involve opportunities for collaboration with scientists at the Lockheed-Martin Research Laboratory through the Stanford-Lockheed Institute for Space Research, the NASA/Ames Research Center, and the SETI Institute.

Stanford is a member of the Universities Space Research Association, a consortium of universities which operates the Lunar Science Institute in Houston, Texas; the University Corporation for Atmospheric Research in Boulder, Colorado; and the San Diego Supercomputing Consortium.

Stanford is the lead institution for the EGRET experiment at the Compton Gamma Ray Observatory and the Solar Oscillations Investigation on the Solar and Heliospheric Observatory spacecraft (SOHO), and participates in the Soft X-Ray Telescope program on the Japanese Yohkoh spacecraft.

Stanford is also a member of the Hobby-Eberly Telescope Consortium which has constructed a 10-meter telescope at the McDonald Observatory of the University of Texas. Full science operations are scheduled to start in 1997.

The facilities of the center are available to any interested and qualified student, who must be admitted by and registered in a department. The departments of Aeronautics and Astronautics, Electrical Engineering, Mechanical Engineering, Applied Physics, and Physics offer opportunities leading to an M.S. or Ph.D. degree for work in space science or astrophysics. The center also offers opportunities to undergraduates who may, for instance, participate in research projects in their junior or senior years, either on a part-time basis during the school year or on a full-time basis during the summer. The Astronomy Course Program operates a small student observatory where students may gain practical experience in astronomical observing. The course list at the end of this entry includes courses of interest to undergraduates as well as courses primarily of interest to graduates.

Further information is available from the director.

**COURSES**

For descriptions, see the listings under the department's section of this bulletin.

**AERONAUTICS AND ASTRONAUTICS**

- 213. Atmospheric Entry
- 236A,B,C,D. Spacecraft Design
- 279. Space Mechanics
- 280. Rocket Propulsion
- 290. Problems in Aeronautics and Astronautics

**APPLIED PHYSICS**

- 312. Basic Plasma Physics
- 363. Solar and Solar-Terrestrial Physics

**ASTRONOMY**

- 15A. The Nature of the Universe
- 15B. Cosmic Horizons
- 27. Evolution of the Cosmos
- 50. Astronomy Laboratory and Observational Astronomy
- 100. Introduction to Observational and Laboratory Astronomy

**ELECTRICAL ENGINEERING**

- 106. Planetary Exploration
- 249. Introduction to the Space Environment
- 350. Radioscience Seminar
- 352. Electromagnetic Waves in the Ionosphere and Magnetosphere
- 354. Introduction to Radio Wave Scattering
- 453. Geomagnetically Trapped Radiation

**ENGINEERING**

- 235A,B. Space Systems Engineering

**GEOPHYSICS**

- 195. Terrestrial Planets

**PHYSICS**

- 18N. Stanford Introductory Seminar: Revolution in Concepts of the Cosmos
- 160. Introduction to Stellar and Galactic Astrophysics
- 161. Introduction to Extragalactic Astrophysics and Cosmology
- 262. Introduction to Gravitation and Astrophysics
- 301. Astrophysics Laboratory
- 360. Stellar Physics
- 362. High Energy Astrophysics
SPANISH AND PORTUGUESE

Emeriti: (Professors) Fernando Alegria, Aurelio M. Espinosa, Jr., Bernard Gicovate, Isabel Magaña Schevill, Sylvia Wynter*

Chair: Mary L. Pratt

Professors: Mary L. Pratt, Michael P. Predmore, Jorge Ruffinelli (Santiago, Autumn; on leave Winter, Spring), Guadalupe Valdés, Yvonne Yarbo-Bejarano

Assistant Professors: Claire Fox, Richard Rosa

Professor (Teaching): María-Paz Haro (on leave 1997-1998)

Courtesy Professor: Hans U. Gumbrecht (French and Italian, and Comparative Literature)

Senior Lecturers: Lyris Wiedemann; (Portuguese Language Director); Irene Corso

Lecturers: Claudia Angelelli, Jeffrey Bersett, José Carrasquel, José Cartagena-Calderón, Sara Cooper, Irene Corso, Juergen Hahn, Caridad Kenna, Alice Miano, Julio Rivera-Montañez, Ana M. Sierra, María C. Urruela

Spanish Language Coordinator: Alice Miano

Visiting Professors: Angeles Encinar, Guillermo Giucci, Beatriz González-Stephan, Beatriz Jaguaribe, Beatriz Mariscal

* Recalled to active duty, Spring Quarter.

The department is committed to four main educational purposes: (1) to provide students with expert training in the Spanish and Portuguese languages at all levels and to enable them to develop their skills in these languages according to their goals and interests; (2) to acquaint students with the literatures and cultures of the Spanish and Portuguese speaking world (Iberia, Latin America, the United States), in terms of both contemporary realities and one thousand years of written and oral tradition; (3) to prepare undergraduates for advanced study in Iberian, Latin American, and Luso-Brazilian languages, literatures, and cultures and/or in language education, and (4) to provide doctoral students with advanced training as research scholars and teachers, in preparation for careers as university teachers or related roles.

The faculty represents a broad range of interests and approaches. In general, the department’s programs are characterized by: (1) a commitment to undergraduate and graduate teaching at the highest intellectual level, (2) a strong interdisciplinary focus that combines the study of literature with that of other forms of cultural expression, (3) a sociohistorical perspective on language, literature, and culture, (4) an effort to maintain a balance among Latin American, Iberian, and U.S. Latino fields, and (5) language study tailored to a range of educational or career goals and native or non-native experience with the Spanish and Portuguese languages.

The department works closely with the Center for Latin American Studies, El Centro Chicano, the Overseas Studies programs in Santiago, Chile, Puebla, Mexico, and selected overseas programs in Spain. It makes extensive use of the resources of the language laboratory and the Language Center. The University library maintains world class collections in Latin American and Iberian Studies and one of the largest research archives in the country in Chicano history and literature. The Hoover Library is an extraordinary resource for particular research topics on Spanish and Latin American intellectual history. Department faculty teach in the School of Education and in the programs in African and Afro-American Studies, Comparative Literature, Drama, Feminist Studies, Film Studies, and Modern Thought and Literature, and the Area One Program. The department houses a Brazilian Writer-in-Residence program developed in cooperation with the Brazilian Ministry of Culture, and hosts visiting faculty from Spain and Latin America on a regular basis.

Completion of Spanish 2A, 3, 3S, 13B or 41C, or Portuguese 1B fulfills the University language requirement.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS MAJORS

Note—The department redesigned its undergraduate major, in Autumn Quarter 1996-97. Students who declared a Spanish major prior to June 1, 1996 may remain under the former requirements or may elect to fulfill the new requirements. The former requirements are found in previous versions of the Stanford Bulletin or in the department’s Undergraduate Handbook. For transition arrangements, see the department’s academic affairs administrator or undergraduate adviser.

The major in Spanish is designed to enable students to develop a concentration in a particular area of interest, accompanied by basic work in two secondary areas. Students may declare the major at any time, and normally do so after completing second-year language training. Some course work toward the major may be completed prior to completing second-year language training. Course work for majors normally follows a sequence of
levels. Students move from second-year language training to 100-level core courses, to 200-level advanced courses.

The major in Spanish requires 50 units in addition to completion of second-year Spanish (13, 13B or equivalent). Course work for the major is grouped under the following subject areas:
1. Latin American/Caribbean studies (including Brazil)
2. Iberian Studies (including Portugal)
3. U.S. Latino studies
4. Language in the Spanish-speaking world
5. Luso-Brazilian language and culture

Students are required to take four courses in one of these areas, two courses in a second and one in a third. Course work for the major must include:
- One quarter of Portuguese language (counts for area 5 above)
- Spanish 101: Structure of Spanish (counts for area 4 above)
- Spanish 140: Methods of Literary and Cultural Analysis (counts for area 1, 2, or 3 above)
- One writing intensive course
- Spanish 298: Senior Seminar (writing intensive optional)

All courses in the department numbered 100 or above count toward the major. With the consent of the student's adviser, up to 10 units of relevant course work outside the department and up to 10 units of course work done in English may be counted toward the major. With the consent of the adviser, up to 25 units of relevant course work taken abroad may be counted toward the major. Courses taken Credit/No Credit cannot be counted toward the major.

How to Declare a Major—Students declaring a Spanish major should contact the Undergraduate Degree Coordinator, room 131, Old Union, and then bring their academic file and major declaration card to the department's academic administrator in the Department of Spanish and Portuguese, Building 260, room 214. One of the undergraduate advisers will ask the new major to fill out a short form indicating a tentative list of the courses he or she wishes to take. This is not a formal proposal; the form allows the adviser to determine the academic needs and ambitions of the student. For general inquiries regarding the Spanish and Portuguese major, contact the department academic administrator at (650) 725-9226.

DOUBLE MAJORS

The major in Spanish and Portuguese is designed to combine readily with a second major in another field and with study abroad. Students may not count the same course to fulfill requirements in both majors.

MINORS

The department offers two minor concentrations. With the consent of the student's adviser, up to 10 units of relevant course work outside the department, and up to 15 units of relevant course work taken abroad, may be counted toward the following minors:

LANGUAGE AND CULTURE STUDIES

This minor is intended for students who wish to focus on developing advanced linguistic competence in Spanish and/or Portuguese, or who wish to combine acquisition of linguistic competence with the study of the literature, thought, culture or language systems of the Spanish- or Portuguese-speaking world.

Requirements—Thirty units of course work at the level of Spanish 11 or above, and/or in Portuguese at any level. Students must take at least three courses in one of the following subject areas:
1. Latin American and Iberian Studies. Recommended are: Spanish 130, 131, 132, 133 and 134; and 150, 151, 160, 161.

CULTURE AND AREA STUDIES

This minor is intended for students who wish to study the literature, culture, or thought of the Spanish- and Portuguese-speaking world without necessarily acquiring proficiency in Spanish or Portuguese language. Students choosing this minor are strongly encouraged to take courses in Spanish or Portuguese language, including reading courses (such as Spanish 50 or Portuguese 50). Such courses count, but are not required, for this minor.

Requirements—Thirty units of course work in Latin American, Iberian, U.S. Latino, or Luso-Brazilian literature, culture, language, and thought studied in the original or in translation.

How to Declare a Minor—For minors in the School of Humanities and Sciences, students must complete their declaration of the minor no later than the last day of the quarter two quarters before degree conferral. For example, a student graduating in June (Spring Quarter) must declare the minor no later than the last day of Autumn Quarter of senior year. Students may declare a minor by going to the Registrar's home page on
the web (http://www-leland.stanford.edu/dept/registrar) and selecting "minor declarations." For general information about the minors, or an appointment with a coordinator, contact the department’s academic administrator at (650) 725-9226.

HONORS PROGRAM
Spanish and Portuguese majors in the junior year, with a grade point average (GPA) of 'B+' or better in all major courses, may apply to the honors program. Honors students are eligible to participate in the honors college at the beginning of their senior year. Students should submit an application for the honors program and a proposal outline by the end of Winter Quarter of the junior year. Each honors student must write an honors essay of 20 to 25 pages under the direction of a faculty member who serves as adviser. Work on the essay normally begins in the Spring Quarter of the junior year and must be completed by the end of the third week of March of the senior year. Consult the undergraduate secretary or the undergraduate adviser for more information.

OVERSEAS STUDIES
All majors are strongly encouraged to study abroad. To transfer credits from programs abroad, consult the Office of the Registrar.

Both the department and Bechtel International Center maintain information banks on study abroad programs. Stanford sponsors the following options:

STANFORD IN SANTIAGO, CHILE
The Stanford Program in Santiago, Chile requires one year of college Spanish, with preference given to students with more advanced language preparation. Course work there is done entirely in Spanish. Detailed information, including curricular offerings, is listed in the “Overseas Studies” section of this bulletin, or at the Overseas Studies Program (OSP) office in Sweet Hall. Research opportunities may be arranged.

STANFORD IN PUEBLA, MEXICO
The Stanford Program in Puebla, Mexico strongly recommends preparation through the level of Spanish 13 (second year third-quarter Spanish) or the equivalent. The minimum required preparation is completion of Spanish 11 (second year first-quarter Spanish) or its equivalent by the time of enrollment in the Puebla program. Students who have completed Spanish 11 prior to Autumn Quarter but have not yet completed Spanish 13 are required to enroll in Spanish 12 or a higher course at Stanford during the Autumn Quarter prior to participation in the Puebla program. Course work at Puebla is done entirely in Spanish in regular courses at the Universidad de las Americas. Detailed information, including curricular offerings, is found in the “Overseas Studies” section of this bulletin, or at the Overseas Studies Program (OSP) office in Sweet Hall. Research opportunities may be arranged.

Students either planning to attend Stanford in Puebla, or returning from this program, are encouraged to consult with the Spanish undergraduate adviser in order to coordinate course work and skills acquired abroad with their degree program.

SPAIN
The Department of Spanish and Portuguese recommends study in Spain with the Hamilton College Academic Year in Spain program, administered by the Department of Romance Languages of Hamilton College in cooperation with faculty members of Williams and Swarthmore colleges. Two distinguishing features of this program are: (1) Spanish must be spoken at all times, both in and outside of class; all students are required to sign a pledge to this effect before their arrival in Madrid; (2) the arrangement of independent study projects in lieu of regular courses. The program is based in Madrid, where the cultural, educational, social, and geographical benefits are optimal.

Students interested in study in Spain should consult Professors Haro or Predmore for information.

INTENSIVE SUMMER PROGRAM
Stanford University offers first-year intensive language and conversation courses in Spanish during the summer. For further information, contact the department or the Summer Session office.

TEACHING CREDENTIALS
For information concerning the requirements for teaching credentials, see the “School of Education” section of this bulletin and the credentials administrator, School of Education.

COURSES FOR BILINGUAL STUDENTS
The department offers a series of second- and third-year courses especially designed for students
who grew up in homes where Spanish is spoken and who wish to develop their existing linguistic strengths. The suffix B in course numbers below indicates these courses.

PROFICIENCY NOTATION
Seniors are encouraged to qualify by examination (given every Spring Quarter) for the departmental Language Proficiency Notation on their transcript, which certifies foreign language competence. For further information, contact Alice Miano, Spanish Language Coordinator, or Lyris Wiedemann, Portuguese Language Director.

COTERMINAL A.B. AND A.M.
The requirements for the coteriminal A.B. are the same as those outlined below for the A.M. No course can count for both the A.B. and A.M. degrees. Contact Graduate Admissions at the Registrar's Office for information.

GRADUATE PROGRAMS

MASTER OF ARTS IN SPANISH
This terminal A.M. degree program is for students who do not intend to continue their studies through the Ph.D. degree. Students in this program may not apply concurrently for entrance to the Ph.D. program. Students must complete a minimum of 45 graduate-level units, 36 of which must have a grade point average (GPA) of 'B' or above.

Requirements—One linguistics course (203, 204, 205, 206, 207); 300, Issues and Methods in the Teaching of Heritage Languages, and/or 301, Methods of Teaching Spanish; one course in literary theory; two 200-or-above courses in Latin American literature and two 200-or-above courses in Peninsular literature; and reading knowledge of one foreign language other than Spanish (preferably Portuguese). Independent study courses (299, 399) and cross-listed courses originating outside the department may not be used to fulfill requirements except by permission of the graduate adviser.

In addition, students may take approved courses in related fields such as classics, comparative literature, education, history of art, linguistics, modern thought, and philosophy. Students planning a career in language teaching may also take part in the University's STEP teacher training program.

DOCTOR OF PHILOSOPHY
The requirements of the Ph.D. are: (1) 90 units of graduate-level course work with a GPA of 'B' or above. Units completed toward the A.M. degree can be counted for the Ph.D.; (2) one course in Spanish linguistics, one course on Methods of Teaching Spanish, and one course on introduction to literary theory; (3) a reading knowledge of Portuguese and one other foreign language; (4) the qualifying paper, the comprehensive, and the University oral examinations, as described below; (5) teaching of three to five courses in the department; (6) completion of a dissertation. Independent study courses (299, 399) and cross-listed courses originating outside the department may not be used to fulfill requirements except by permission of the graduate adviser. For basic residency and candidacy requirements, see the "Graduate Degrees" section of this bulletin. For further information, consult the department's Graduate Student Handbook.

Newly admitted students are required to take an oral proficiency examination in Spanish by the third week of Autumn Quarter to determine the level of previous preparation. The student is required to remedy deficiencies indicated by this examination before a teaching assignment is awarded. In preparation for teaching, Ph.D. candidates must take Spanish 301, and/or Spanish 300 in the first year.

In consultation with the adviser, students select one major field of study from the following: (1) Spanish Literature of the Golden Age, (2) Modern Spanish Literature, (3) Spanish-American Literature to Independence, (4) Spanish-American Literature of the 19th and 20th Centuries, (5) Chicano Literature. In addition, candidates select two secondary areas of study outside the major field from the following: (1) Spanish Medieval Literature, (2) Spanish Literature of the Golden Age, (3) Modern Spanish Literature, (4) Spanish-American Literature of the Colonial Period, (5) Spanish-American Literature from Independence, (6) Chicano Literature, (7) Literary Theory, (8) Linguistics, (9) Spanish-American Film, (10) Brazilian Literature.

At least four courses must be taken in the major field of study. At least two courses must be taken in each secondary area. Students whose major field is in Spanish-American or Chicano Literature must choose one secondary area in Peninsular literature and vice versa. One secondary area of concentration may be taken outside the department in consultation with the adviser.

In addition to the department's course offerings, students may take relevant courses with the approval of their adviser in other departments and programs, such as the graduate programs in Comparative Literature, Feminist Studies, History, Humanities, or Modern Thought and Literature. It is also possible to complete a minor in another department with approval of the adviser. Normally, not more than 25 units are taken outside the department.

After the first year of study, the student's progress is evaluated by the faculty to determine whether continuation to the Ph.D. is recommended and whether there are particular areas where improvement is needed. For this evaluation, students sub-
mit a term paper of approximately 20 pages by the first week of Autumn Quarter of the second year.

If approval of the qualifying paper is granted, the student should file a formal application for candidacy no later than the end of the second year, as prescribed by the University. Course requirements are usually completed by the third year of study. A written comprehensive examination on the major field and secondary areas is then taken. The examination is based on a list of readings, selected in consultation with the adviser, which integrates major and secondary topics in both Peninsular and Latin American Studies. At this time, students hand in a long research paper to be evaluated by the faculty. For further details, consult the Graduate Student Handbook.

Following the examination, students should find a topic requiring extensive original research and request that a member of the department serve as dissertation adviser. The student must complete the Reading Committee form and request that the chair approve a committee to supervise the dissertation. The committee may advise extra preparation within or outside the department, and time should be allowed for such work. The University oral examination usually takes place one or two quarters after passing the comprehensive examination. The oral examination covers plans for the dissertation based on a prospectus approved by the committee (15 to 20 pages), and may be taken in English, Spanish, or Portuguese.

The dissertation must be submitted to the reading committee in substantially final form at least four weeks before the University deadline in the quarter during which the candidate expects to receive the Ph.D. degree. Ph.D. dissertations must be completed and approved within five years from the date of admission to candidacy. Candidates taking more than five years must apply for reinstatement of candidacy.

**Ph.D. MINOR**

For a minor in Spanish or Portuguese, the student must complete 25 units, with a grade point average (GPA) of 'B' or above, selected from courses numbered 200 or higher.

Students who choose a minor in another department should consult with advisers in that department.

**JOINT Ph.D. PROGRAMS**

The Department of Spanish and Portuguese participates in the Graduate Program in Humanities leading to a joint Ph.D. degree in Spanish and Humanities. For a description of that program, see the “Humanities Special Programs” section of this bulletin.

**COURSES**

(WIM) indicates that the course meets the Writing in the Major requirements.

**OVERVIEW**

1. General Courses (100E-399E, given in English)
2. First- and Second-Year Language (1-99)
3. Advanced and Specialized Language (100-129)
4. Literature, Culture, Linguistics and Theory
   a) Stanford Introductory Seminars, freshman preference (110N-119N)
   b) Introductory Courses (130-199)
   c) Courses for Advanced Undergraduates and Graduates (200-299)
      Advanced Language, Linguistics, and Theory (200-212)
      Peninsular Literature (213-239)
      Medieval and Golden Age Literatures (211-219)
      Modern and Contemporary Literatures (220-229)
      Genre Survey Courses (230-235)
      Individual Authors (236-239)
      Latin American Literature (240-279)
      Periods, Genres, and Literary Movements (240-255)
      National and Regional Literatures (256-262)
      Individual Authors (263-269)
      Luso-Brazilian Literature (270-279)
      Chicano Literature (280-289)
      Special Topics (290-298)
      Individual Work (299)

5. Graduate Seminars (300-399)
   a) Linguistics, Methodology, and Literary Theory (300-313)
   b) Peninsular Literature (314-339)
   c) Latin American Literature (340-369)
   d) Luso-Brazilian Literature (370-379)
   e) Chicano Literature (380-389)
   f) Special Topics (390-398)
   g) Individual Work (399)
   h) Dissertation Research (802)

Courses are taught in Spanish or Portuguese unless otherwise noted. Course numbers followed by an “E” are taught in English. Spanish and Portuguese are listed separately in the Time Schedule.

**GENERAL**

These courses are open to all undergraduate and graduate students, and are taught in English. Majors are normally expected to read in the original. For courses above 200, some prerequisites may apply. Readings are usually available both in the original and in English translation.

Hands-on introduction to the methods and topics of archival research on the visual and verbal arts and their sociohistorical context. Student (original) research projects use the digital archive "Chicana Art," and the Special Collections in Green Library, which house the papers of major Chicana/o artists, writers, activists, and intellectuals. Introduction to the digital archive and Green’s Special Collections; formulation of each student’s research interests. Presentations by the students on the development of their projects, culminating in a research paper.

133E. Portuguese Cultural Perspectives—Major historical facts (from the formation of the nation to the present): from monarchy to republic, the so-called “Discoveries,” colonization, decolonization, integration into the European Union, Portugal’s role in international organizations. The arts: main cultural movements and their expressions in painting, literature, architecture, cinema, and music.

154E. Don Quijote—Close reading of the text in the context of the prevailing literary traditions and cultural forces of 16th-century Spain, and in modern-day reception according to current scholarship.

168E. Chilean Studies: Modern Chilean Culture through Music, Film and Literature 1945-1997—(Same as Latin American Studies 120.) Recommended for students planning to attend the Santiago program and open to all students. Introduces students to the history, culture, politics, and literature of Chile, mainly in the 20th century.

169E. Cultural Dimensions of Globalization—Recommended for students working up an honor’s thesis proposal or a research grant proposal. The relationship between national identity and culture. How do different disciplines define “culture” and the “nation?” How do phenomena such as international trade in consumer goods, transitional migration, and global mass media affect the way in which peoples identify themselves? Readings from “case histories” in the humanities and social sciences.

170E. Fiction and Political Imagination—The ways contemporary Latin American writers explore and debate the realities of their societies and their visions for the future. How literary forms and symbolic structures create sociohistorical understanding, and how literature itself interacts with social and institutional structures and historical circumstances. Focus is on contemporary literary texts from regions undergoing social, cultural, and political transformations: Mexico, the Andean region, and the Southern Cone (Argentina/Chile). Authors: Carlos Fuentes, Alicia Partnoy, Juan Rulfo, José Marfa Arguedas, Pía Barros, Manuel Puig. Domitila Barrios de Chungara, etc. Audiovisual materials contextualize written texts.

171E. Eça de Queirós, Liberalism and Portuguese Realism—Through novels and short stories by Eça de Queirós (1845-1900), Portugal’s greatest 19th-century novelist, students study the cultural setting of the liberal era realism’s ironic and humorous discourse and social satire.

172E. Portuguese Literature: The Drama of Gil Vicente—Gil Vicente is the greatest Portuguese playwright. His works reveal a cultural transition between the Middle Ages and the Renaissance. Focus is on the way Gil Vicente’s tragicomedies depict and satirize his era. Dramatic techniques and the humorous language.

173E. Portuguese Poetry in Translation: Middle Ages to Renaissance—Survey of literature movements and texts, with emphasis on the Middle Ages and the renaissance. Lyric poetry of the Middle Ages and neoclassic, epic and lyric texts by the author of The Lusiads, Luis de Camões. Lectures in English, texts in English translations; originals in Portuguese are provided for students who speak or read that language.

174E. Traditional Oral Literature and the Modern, Post-Independence Literature of the Lusophone African Countries—Traditional communities of Africa and their cultures, and the role of oral literature in education as a means to preserve history and as a vehicle to express traditional African philosophy. Makes use of modern, post-independence literature, humor, criticism and the re-encounter of the traditional world.

175E. Literature of Struggle as a Discourse for Freedom in Lusophone Africa—Analysis of the literature of struggle as a process of affirmation of the culture and political identities of African societies on their way to freedom in Angola, Guinea-Bissan, Cape Verde, Mozambique, São Tomé and Príncipe. Lusophone African intellectuals, their associations and connections with other cultural groups around the world.

176E. Introduction to Portuguese Linguistics—For students with little or no knowledge in the field of linguistics, but who have a basic knowledge of any Romance language. A description of the Portuguese language in a diachronic and synchronic perspective and a historical study of the language from Latin to modern Portuguese, Portuguese grammar, and the influences of African, Asian, American, and European languages on Portuguese as a result of cultural contacts. Standards of Portuguese
spoken in Angola, Brazil, Cape Verde, Guinea-Bissau, Mozambique, San Tome and Principe; the Creoles of Portuguese; and the use of Portuguese language in the written literatures of Lusophone countries.

3-5 units (de Carvalho)


3-5 units (de Carvalho).

193Q. Stanford Introductory Seminar: Spaces and Voices of Brazil—Preference to sophomores. Introduces the fundamental aspects of Brazilian culture through a general view of Brazil's five cultural-geographical regions and an analysis of figures which contributed to shape the image of modern Brazil. Discussions are fostered by readings on Brazilian culture, viewing of movies and documentaries, and the analysis of short stories and/or journalistic materials covering: Carmen Miranda, Lula, António Carlos Jobim, Jorge Amado, Zélia Gatai, Pele, Chico Mendes, Benedita da Silva, Chico Buarque de Holanda, etc.

3-5 units, Win (de Carvalho).

194E. Film and Literature: U.S.-Mexico Border Representations—How the border has been represented in 20th-century movies and literature. The relationship between film and literature itself: how each handles narration and point of view, and how each has influenced and borrowed from the other. Weekly film screenings mandatory. Readings/class discussion in Spanish and English.

3-5 units (Fox)

210E. Anglophone Caribbean Literature—Survey of major Anglophone Caribbean writers, with emphasis on narrative fiction and literary criticism. Authors: Rhys, Selvon, Brathwaite, Cliff, Kincaid, Adisa, Brand.

3-5 units (Fox)

225E. Theater, Society, and Politics in 20th-Century Spain—Concentrates on the two major 20th-century Spanish dramatists: Ramon del Valle-Inclán and Federico García Lorca. The innovative, avant-garde nature of their major plays (symbolism, expressionism, realism) and the dramatists' engagement with fundamental social and political issues of the times (feudalism, newly emerging liberal state, women's protest, class struggle, civil war).

3-5 units (Predmore)

291E. “Race,” Discourse, and the Origin of the Americas: The History that Literature Makes—Major literary and other texts related to the arrival of Columbus and the Spaniards in the Caribbean, to the prelude voyage of the Portuguese around Cape Bojador, their landing on the shores of W. Africa, and to the subsequent yoking of three separate worlds. The central role played by the literary and correlated juridico-theological texts of the time in the structuring of the post-1492 societies of the New World. Race as a basis of a status-organizing principle replacing the feudal principle of caste, a code that would be inseparable from the Renaissance's "invention of Man," the rise of the modern state, and the global expansion of the West.

3-5 units, Spr (Wynter)

306E. Introduction to Literary Criticism and Theory: Sociocriticisms—Literary theorists who have proposed systematic approaches to literature in relation to the structures of society and of consciousness. "Classic" figures are combined with recent critics theorizing from non-European contexts. Readings: Northrop Frye, Raymond Williams, Jean Franco, Terry Eagleton, Angel Rama, Patricia Hill Collins, Gayatri Spivak, Edouard Glissant, Jean Bernabe, Néstor García Canclini, Pierre Bourdieu, Henry Louis Gates, etc.

3-5 units (Pratt)

308E. Scholarly Research and Writing: Workshop and Tutorial—Doctoral students produce a scholarly research; argumentation, questions of audience and expression, use of secondary sources, and other topics. Collaborative projects welcome. Group meetings and individual tutorials. Enrollment limit to 10.

3-5 units, Win (Pratt)

309E. Criticism and Colonialism—Critical approaches to literature and the study of literature and culture in relation to colonialism, neocolonialism, and the postcolonial world. Topics: representations and hegemony, transculturation, cultural dimensions of decolonization and resistance, psychoanalysis and colonial subjects, ideologies of masculinity and the feminine, colonial discourse, nationalism and the first world/third world distinction, popular culture, and syncretism. Readings from Europe, N. America, Latin America, Africa, and the Caribbean.

3-5 units (Pratt)

348E. Contemporary Cuban Narrative and Marxist Aesthetics—Cuban novels since the '60s as a way to question and reflect Marxist theories of literature. How Cuban writers appropriate and nationalize Marxist theories of representation to reconcile them with a construction of a "Cuban" or "Caribbean" self within the frame of the revolutionary state. Recent cultural debates through the readings of fiction and theory, e.g., the relationship between self and community, organic intellectuals, ideology and the state, popular culture, etc. Read-
LANGUAGES: Lezama Lima, Carpentier, Reinaldo Arenas, Lisandro Otero, Daena Chaviano, etc.

3-5 units (Rosa)

360E. Modern Brazilian Literature and Culture: City and Culture in Brazil—Explores the urban repertoires of the city in Brazilian culture by discussing the differences between notions of urban culture at the end of the 19th and 20th century. To interpret the city becomes equivalent to evaluating modernity at large. The sources of analysis of these urban scenarios are films, mass media productions, architecture, and literature. Readings from Machado de Assis, João do Rio, Lima Barreto, Maria Alice Rezende de Carvalho, Walter Benjamin, Ulf Han- nerz, Susan Buck-Mors.

3-5 units, Win (Jaguaribe)

LANGUAGE PROGRAM

Completion of Spanish 2A, 3, 3S, 13B, or 41C, or Portuguese 1B fulfills the University language requirement.

Students registering for the first time in a first- or second-year course must take a placement test if they studied Spanish before entering Stanford. Students who have passed the AP exam with a 4 or 5 are exempted from the test, and are eligible for 10 units of credit in Spanish. These students should contact a department adviser to determine the course option that best corresponds to their preparation.

Students who have a home background in Spanish (who grew up in homes where Spanish is spoken) should take the placement test for the special series of courses (11B, 12B, 13B) designed for bilingual students. The bilingual series fulfills the language requirement at Stanford.

Note—A grade of ‘C’ or better is required to enter the next higher course in the language sequence. Language courses cannot be repeated for credit. Auditors are not permitted in language courses.

FIRST-YEAR LANGUAGE

SPANISH

1,2,3. First-Year Spanish—By the end of the sequence, students are able to engage in interactions with speakers of Spanish for a variety of purposes and contexts using socially and culturally appropriate forms for participating in conversations, establishing relationships with others, providing and obtaining information, expressing feelings and emotions, and expressing opinions. Students can understand and interpret the written and spoken language on a variety of topics and manifest growing awareness of the social and cultural influences shaping the production of oral and written texts in the Spanish- and English-speaking worlds, and are able to present information, concepts, and ideas to an audience of listeners or readers on a variety of academic topics. Comple-

tion of 3 fulfills the University’s language requirement.

5 units, Aut, Win, Spr (Staff)

1A,2A. Accelerated First-Year Spanish—Completes the first-year language sequence in two rather than three quarters. Recommended only for students who have previous knowledge of Spanish or a strong background in another Romance language. 2A fulfills the University language requirement.

5 units, Aut, Win, Spr (Staff)

1S,2S,3S. First-Year Individualized Spanish—Primarily for seniors who have demonstrably restrictive scheduling conflicts and must complete the language requirement for graduation. Students proceed at their own pace, working with text and tapes. The instructor is available for consultation on a regular basis. Students who complete more than one course (5 units) of series 1S, 2S, 3S must complete 10, or pass a first-year oral proficiency examination. Completion of 3S fulfills the University language requirement. Enrollment limited; consent of instructor required.

3-10 units, Win (Hahn)

10. Elementary Conversation—Conversation practice supplementing 2 or 3. May also be taken when the student intends to continue in first-year series but where current course load does not permit. Prerequisite: 1 or equivalent.

2 units, Aut, Win, Spr (Staff)

4A,B,C. Intensive First-Year Spanish—Stanford graduate students restricted to 9 units may take two or three courses in the series for a total of 9 units, or one course for 5 units. Upon completion, students are able to engage in interaction with speakers of Spanish for a variety of purposes and in a variety of contexts, using socially and culturally appropriate forms for participating in conversations, establishing relationships with others, providing and obtaining information, expressing feelings and emotions, and expressing opinions. Students can understand and interpret written and spoken language on a variety of topics and manifest growing awareness of the social and cultural influences shaping the production of oral and written texts in the Spanish- and English-speaking worlds, and are able to present information, concepts, and ideas to an audience of listeners on a variety of academic topics. Completion of 41C fulfills the University’s language requirement. See the Summer Session Catalogue, 1998. Enrollment limited to 15. No auditors.

5-15 units, Sum (Staff)

50. Reading Spanish—For students who have already taken Spanish for at least one full year or have superior reading proficiency in another Romance language. Intensive emphasis on comprehension of academic texts. Fulfills University reading requirements for advanced degrees if students earn at least a grade of ‘B.’

3 units, Spr (Sierra)
PORTUGUESE

1A, 2A. First-Year Portuguese—By the end of the first-year sequence of the Portuguese language program, students are able to engage in interactions with speakers of Portuguese for a variety of purposes and in a variety of contexts using socially and culturally appropriate forms for participating in conversations, establishing relationships with others, providing and obtaining information, expressing feelings and emotions, and expressing opinions. Students can understand and interpret written and spoken language on a variety of topics and manifest growing awareness of the social and cultural influences shaping the production of oral and written texts in the Portuguese-speaking world, and are able to present information, concepts, and ideas to an audience of listeners or readers on a variety of academic topics. Recommended for students with at least two years of formal study of a Romance language. Completion of 2A fulfills the University’s language requirement.

1A. Accelerated First-Year Portuguese (Part 1)—Fast-paced. Follows a proficiency-oriented approach, emphasizing speaking and oral comprehension. Students learn the language as they contrast Brazilian culture with their own. Lab.

5 units, Aut, Win, Spr (Wiedemann)

2A. Accelerated First-Year Portuguese (Part 2)—Continuation of 1A. Fast-paced and recommended for students with a background in a Romance language. Emphasizes speaking and oral comprehension proficiency and promotes the beginning of the development of reading and writing skills. Literary and journalistic readings, studying Brazilian popular music, and viewing of short documentaries provide the basis for discussions on a variety of Brazilian cultural aspects and current events. Prerequisite: 1A or equivalent.

5 units, Aut, Win, Spr (Wiedemann)

2C. Elementary Portuguese Conversation—Conversation practice as a supplement to 2A.

2-3 units, Win (Staff)

50. Reading Portuguese—For students with superior reading proficiency in Spanish. Reading competence and oral comprehension for research and courses in Luso-Brazilian studies. Overview of grammar. Literary, journalistic, and academic readings. Fulfills University reading requirements for advanced degrees.

3 units, Spr (Staff)

SECOND-YEAR LANGUAGE

SPANISH

11C, 12C, 13C. Second Year Spanish—Students become aware of and are able to use socioculturally appropriate language in a variety of situations, formal and informal, academic and professional. Greater emphasis is placed on the presentation—writing reports on topics of interest to students who develop the ability to comprehend and interpret oral and written language. Can be taken in any quarter.

4 units, Aut, Win, Spr (Staff)

11R, 12R, 13R. Second-Year Spanish with an Emphasis on International Relations—Content-based approach focusing on politics in the Spanish-speaking world and international relations. The Hispanic world today, geographically, socially, and economically. Develops correct usage in contemporary Spanish through the reinforcement of reading, writing, listening, and speaking abilities. Primary texts from Latin America and Spain. Meets for two intensive two-hour sessions per week using an activity-based method. Fieldwork projects for an optional unit.

4-5 units, Aut, Win, Spr (Angelelli)

15. Intermediate Conversation—Recommended as complement to second-year courses. Prerequisite: 3 or equivalent.

3 units, Aut, Win, Spr (Staff)


1-5 units (Staff)

BILINGUAL STUDENTS

11B, 12B, 13B. A special series designed for students who grew up in homes where Spanish is spoken, and who wish to develop their existing linguistic strengths.

11B. Second-Year Spanish for Bilingual Students—Emphasis is on developing the ability to successfully communicate orally or in writing with persons with whom students come into personal contact. Intensive and extensive reading of selected texts.

4-5 units, Aut (Staff)

12B. Written and Spoken Language for Bilingual Students—Emphasis is on developing the ability to understand, interpret, and critically analyze a variety of print and non-print materials such as movies, radio and television broadcasts, short novels, short stories, and newspaper editorials. Extensive reading of texts from a number of fields and disciplines. Writing of summaries and reviews. Prerequisite: 11B or consent of instructor.

3-5 units, Win (Staff)

13B. Multipurpose Communication for Bilingual Students—Emphasis is on developing the bilingual students’ abilities to use the oral and written language appropriately for a variety of purposes, focusing on the development of styles and registers used in more formal settings. Prerequisite: 12B or consent of instructor.

3-5 units, Spr (Staff)
18M, 19M. Spanish for Bilingual Pre-Med Students—For pre-med students who grew up in homes where Spanish is spoken or for pre-med students that have learned Spanish as a foreign language and possess a considerable command of this language. Emphasis is on oral communication with Spanish-speaking patients on topics related to their health. Students participate in the organization and participation of a workshop on health-related topics prepared for a Spanish-speaking community outside campus.

3-4 units, Win, Spr (Sierra)

21B, 22B, 23B. For students who grew up in homes where Spanish is spoken, and who wish to further develop their Spanish language strengths to use them for academic and professional purposes.

21B. Advanced Spanish for Bilingual Students, First Quarter—Oral and written use of Spanish for academic purposes, focusing on developing the ability to give presentations and write essays aimed at academic audiences.

3-5 units, Aut (Sierra)

22B. Advanced Spanish for Bilingual Students, Second Quarter—Oral and written use of Spanish for academic and professional purposes in students’ field of study. Focus is on developing stylistic appropriateness in writing and presenting research papers to academic and professional audiences.

3-5 units, Win (Sierra)

23B. Advanced Spanish for Bilingual Students, Third Quarter—Oral and written use of Spanish for professional purposes and for communicating with other Spanish-speaking colleagues. Presentations and essays for audiences that need information to compare the general tendencies of the professions in the U.S. to those in other Spanish-speaking countries.

3-5 units, Win (Sierra)

PORTUGUESE

11A, 12A Second-Year Portuguese—By the end of the second-year sequence of the Portuguese language program, students are able to engage in interactions with speakers of Portuguese belonging to different sociolinguistic groups, using socially and culturally appropriate forms. Students can understand and interpret written and spoken language on a variety of topics, are able to judge, discuss, and defend points of view, work in increasing depth on academic topics of their own interest in the target language, and present original information, concepts, and ideas to an audience of listeners or readers on a variety of genres and with an array of different purposes.

11A. Accelerated Second-Year Portuguese (Part 1)—Fast-paced study of the three of the five cultural-geographical regions of Brazil as a means of developing listening, speaking, reading, and writing proficiency. The regions are contrasted through discussions fostered by the viewing of movies, reading of plays, short stories and journalistic materials, Brazilian popular music, and listening to speakers from each region. Prerequisite: first-year sequence, equivalent, or consent of instructor.

5 units, Aut, Win, Spr (Wiedemann)

12A Accelerated Second-Year Portuguese (Part 2)—Continuation of 11A. Fast-paced, providing further development of listening, speaking, reading and writing proficiency. Studies two of the five cultural-geographical regions of Brazil, and other Portuguese-speaking areas as a means of developing listening, speaking, reading and writing proficiency. The regions are contrasted through discussions fostered by the viewing of movies, reading of longer text of different genres, Brazilian popular music, and listening to speakers from each region. Prerequisite: 11A, or consent of instructor.

3-5 units, Aut, Win, Spr (Wiedemann)

15. Intermediate Portuguese Conversation—Conversation practice recommended as a supplement to the second-year sequence. Prerequisite: completion of first-year sequence, enrollment in 11A, or consent of instructor.

2-3 units, Spr (Staff)

50. Reading Portuguese—For students with superior reading proficiency in Spanish. Reading comprehension for research and courses in history, political science, Latin American and Luso-Brazilian studies and other academic areas. Journalistic and academic readings. Fulfills University reading requirement for advanced degrees.

3 units, Spr (Staff)

100. Advanced Portuguese Conversation—Practice recommended as a supplement to the second-year sequence. Prerequisite: 12A, equivalent, or consent of instructor.

2-3 units, Spr (Staff)


4 units, Win (Wiedemann)

ADVANCED AND SPECIALIZED SPANISH

For courses in literature and culture, see below.

100. Advanced Conversation—Conversation and discussion of contemporary issues, based on Hispanic newspapers and magazines, short stories, and cinema. Prerequisite: 13 or equivalent.

1-3 units, Aut, Win, Spr (Staff)
101. Structure of Spanish—Advanced study of the grammatical systems of Spanish and how to teach them effectively. Students are expected to research topics, prepare presentations, and develop teaching materials.

3-5 units, Win (Angelelli)

102. Composition and Writing Workshop—Focuses on individual development of the ability to write in Spanish. Emphasis is on style and diction and on preparing and writing essays on literary topics. Prerequisite: two years of college Spanish, Bilingual Spanish Series at Stanford, or equivalent.

4 units, Win (Staff)

110. Introduction to Translation—Theoretical framework and overview of basic translation strategies for a variety of text categories.

4 units, Win (Angelelli)

111N. Stanford Introductory Seminar: Contemporary Spain—The Challenge of Change, from Fascism to Democracy (1939 to Present)—Preference to freshman. The years marked by experimentation and change in many areas of life in Spain. Society and culture from postwar times and the transition years from the Franco regime to the present democratic state. Students research projects on the topics and issues, and participate in discussions. Prerequisite: AP (4-5) in Spanish language or literature, or equivalent knowledge.

3 units (Haro)

121L,122L. Spanish for Legal Professions—Open only to law students. Designed for lawyers who need to work with Spanish-speaking clientele. Legal terminology is combined with a review and practice of grammar for adequate oral and written expression in legal situations. Comparison of Common Law and Roman Law systems and some issues where the two legal systems might not correspond. Uses legal documents and materials. Law semester calendar.

3-5 units, Aut, Win, Spr (Angelelli)

121M,122M,123M. Spanish for Medical Students—(Same as Health Research and Policy 280, 281, 282.) Geared to achieve a practical and rapid command of spoken Spanish. Topics: the human body, hospital procedures, diagnostics, food, and essential phrases for on-the-spot reference when dealing with Spanish-speaking patients. Series can be taken independently, depending on the level of prior knowledge.

3 units, Aut, Win, Spr (Angelelli)

125. Spanish for the Professions—Third-year level, aimed at students who wish to continue developing their skills in speaking, reading, writing, and comprehension. Strengthens foreign language development in students' own disciplines of study. Written and oral presentations required. Helps to prepare for the proficiency exam which must be passed in order to obtain the official transcript notation certifying foreign language proficiency. Extra unit for individual project. Prerequisite: 13, 13B, or equivalent.

4-5 units, Spr (Staff)

LITERATURE, CULTURE, LINGUISTICS, AND THEORY

The following courses require strong competence in the Spanish or Portuguese language. They are taught in Spanish or Portuguese; for additional courses taught in English, see "General Courses" section above. Enrollment in 200-level courses normally requires completion of three 100-level courses; 100-level courses require Spanish 13, 13B, or equivalent. 300-level courses are graduate seminars.

130,131,132,133,134. Cultural Perspectives—For students interested in the culture of Spanish and Portuguese speakers. Readings and topics for discussion and composition include socio-cultural and historical material from Spain, Portugal, Brazil, Spanish America, and the Mexican-Chicano, Puertoqueno, and Cubano heritages. Art, current events, folklore, history, language, and literature topics are supplemented by slides, movies, tapes, and occasional field trips.

130. Spanish Cultural Perspectives
4 units, Spr (Welz)

131. Spanish American Cultural Perspectives
4 units, Aut (Ferdinand)

132. Mexican and Chicano Cultural Perspectives
4 units (Staff)

133E. Portuguese Cultural Perspectives
4 units, Aut (de Carvalho)

134. Brazilian Cultural Perspectives
4 units, Spr (Staff)

Aut (de Carvalho)

135. Caribbean Cultural Perspectives
4 units, Win (Lazi)

140. Introduction to Methods of Literary and Cultural Analysis—For students with little or no background in literary analysis. Introduces basic terminology of literary theory and critical approaches to literature through textual analysis. Emphasis varies with instructor. Prerequisite: 13, 13B, or equivalent.

3-5 units, Aut (Rosa)

150,151. Spanish Literature—Basic introduction to Spanish Peninsular literature. Sequence deals with major works from several periods and genres preparing for more specialized 200-level courses. Prerequisite: 13, 13B, or equivalent.

150. Spanish Literature I—The spirit of Spain in its early literature. Medieval and Golden Age masterpieces that establish and reflect Spain's unique identity (Christians, Jews, Moors) and create its traditions. Close reading of El libro
de buen amor, Poema del Cid, La Celestina, Lazarillo de Tormes, El Burlador de Sevilla, Gacilaso, Cervantes, Góngora, Lope de Vega, Calderón.

3-5 units (Staff)

151. Spanish Literature II—Representative works of Spanish literature from the 1830s to the 1930s: Larra, Espronceda, Bécquer, Galdós, Unamuno, Valle-Inclán, Machado, and Lorca. Emphasis is on a close reading of the texts in relation to the "problem of Spain" within the democratic tradition of Spanish liberalism.

3-5 units (Staff)

156. Contemporary Spanish Short Story—The evolution of the short story in Spain from the Civil War to the present. Antecedents to the short story in Spain in the 20th-century, brief analysis of the narrative of the 1940s, and of the social realism of the 1950s and 60s. Beginning with the 1970s, stories are read in light of the new ideological and sociological transformation in Spain. Focus is on the formal and structural aspects of selected readings.

3-5 units, Win (Predmore)

160,161. Spanish American Literature—Introductory survey of major works from several periods and genres. Prerequisite: 13, 13B, or equivalent.

160. Spanish American Literature I—Major themes, writers, and cultural debates from the Colonial Period to independence. Novels, poems, essays, and periodicals from Latin America.

3-5 units, Win (Rosa)

161. Spanish American Literature II—Continuation of 160, from independence to the present. Readings from a range of genres including essay, poetry, short story, and the novel.

3-5 units, Spr (Fox)


3-5 units (Haro)

199. Individual Work—Open only to students in the department, or by consent of instructor.

1-12 units (Staff)

ADVANCED UNDERGRADUATES AND GRADUATES

LANGUAGE, LINGUISTICS, AND THEORY

203. History of the Spanish Language—The development of the Spanish language from its earliest days to the present. Focus is on the historical circumstances in which the growth of the Spanish language took place, and on the phonological, morphological, and syntactic changes that took place during of this development.

3-5 units, Spr (Valdés)

204. Second Language/Second Dialect Acquisition—Introduction to adult second language/second dialect acquisition in tutored environments. Focus is on questions posed by the nature of Spanish-language teaching and learning. Prerequisite: 101 or equivalent.

3-5 units (Valdés)

205. Dialectology of the Spanish Language—Focuses on the major varieties of Spanish as they are spoken in Spain and in the Americas. Introduction to dialect geography and to the study of social and regional variation from a sociolinguistic perspective.

3-5 units (Valdés)

206. Spanish use in Chicano Communities—The significance and consequences of language diversity in the culture and society of the U.S. Using Spanish-English Chicano bilingual communities, focuses on the experiences of non-English background individuals in this country.

3-5 units (Valdés)

207. Theory and Issues in the Study of Bilingualism—(Same as Education 149/249.) Fulfills linguistics requirement. Key issues in the study of bilingualism from a sociolinguistic perspective. Focus is on typologies of bilingualism, the acquisition of bilingual ability, the description and measurement of bilingualism, and the nature of societal bilingualism. Prepares students to work with bilingual students and their families and to carry out research in bilingual settings.

4 units, Aut (Valdés)

PENINSULAR LITERATURE

215. Oral Poetry: The Romancero—The development of the most popular and persistent genre in Hispanic culture, "the Ballad." Its oral origins in the Middle Ages, through its flowering during Spain’s Golden Age when poets, playwrights, and other writers diffused the genre throughout the Spanish-speaking world. The present, when, in spite of radical changes in social practices and aesthetics, the Spanish Ballad survives in the collective memory of many Spanish-speaking communities and serves as social commentary in such forms as the corrido.

3-5 units, Aut (Mariscal)

216. Don Quijote—Don Quijote in relation to the principal literary traditions and cultural forces of the European Renaissance.

3-5 units

217. Don Quijote—Continuation of 216.

3-5 units
222. The Problem of Two Spains: Literature and Society in 19th-Century Spain—Representative literary figures of 19th-century Spain: Larra, Espronceda, Zorrilla, Rosalía de Castro, Bécquer, and Galdós. Major directions in modern lyric poetry and in the modern realist novel are studied against the background of Napoleonic invasions, the loss of overseas colonies, two Carlist civil wars, and frustrated attempts to establish the First Spanish Republic. Emphasis is on close textual analysis.
3-5 units (Predmore)

3-5 units, Aut (Predmore)

224. The Literature of the Spanish Republic: Civil War and Aftermath—The significance of the Civil War for Spanish, European, and world history; the International Brigades. The effect of war on the literary and cultural life of the country and the response of writers from Spain (Alberti, Lorca, Machado) and Latin America (Guillén, Neruda, Vallejo). Literary protest during the Franco regime by such figures as Aleixandre, Alonso, Cela, and Sender.
3-5 units, Win (Predmore)

225. Modern Hispanic Poetry—Representative poems from 19th- and 20th-century Hispanic poets (Rosalía de Castro, Bécquer, Darío, Unamuno, Machado, Lorca, Neruda, etc.). Provides a basic introduction to the elements and devices of lyric poetry: figurative language, image, symbol, metaphor, irony, meter, meaning, idea.
3-5 units, Spr (Predmore)

LATIN AMERICAN LITERATURE

242. Puerto Rican Literature: The Elusive Nation—The production, circulation, and renegotiation of different projections of Puerto Rican identity. Puerto Rico as an extreme case of the phenomenon in which cultural nationhood is constructed apart from political status. The implications and contradictions of this disjunction and the strained relationships between classes, races, genders, and languages, which contributes to an ambivalent discourse that keeps the "nation" as something permanently postponed. Historical and contemporary texts on culture and geographical representation, mobility and migration, selfhood, and space. Readings: Hostos, Pedreira, Soto, Ana Lydia Vega, Pedro Pietri, Luis Rafael Sánchez, Mohr.
3-5 units, Win (Rosa)

243. Nuyorican Literature—Focus is on the literary strategies developed by Nuyorican authors, emphasizing the issues of the construction of identity, the representation of race and gender, and the relations with the community and with other racial and ethnic communities. Readings: Thomas, Algarfín, Piñero, Esteves, Laviera.
3-5 units (Rosa)

244. Latino Narrative—Examines texts produced by Puerto Rican, Cuban, and Dominican-American writers, popular musicians, and other artists, and how they construct their identity as Latinos by establishing different alliances along racial, ethnic, gender, and sexual lines. How these texts articulate a mobile and fluid site through which the negotiation of a "self" becomes possible. The politics of language, the re-elaboration of their countries' histories, their re-inscription in a new narrative, and the construction of alternative spaces as ways of cultural and political resistance. Authors: Julia Alvarez, Piri Thomas, Esmeralda Santiago, Oscar Hijuelos, Nicholasa Mohr.
3-5 units (Rosa)

252. Contemporary Mexican Thought—Writings of theorists of mexicanidad from the post-Revolutionary era to the 1960s (Vasconcelos, Ramos, Zea, Paz). The work of these pensadores in light of recent critiques and refashionings of the concept of national identity including cultural theory, performance art, plastic arts, popular fiction, and activist movements.
3-5 units (Fox)

255. The New World and the Machine: The Technological Imagination in Latin America—The representation of technology in the social and aesthetic expressions of Latin American cultures 1900-1940. The machine as a metaphor of modernity becomes a focus of celebration and debate within the new modernist artistic movements, mass media productions, and the political arena. Representations of the machine constitute a mapping of ideas between the modernizing centers and peripheral societies. Topics: tradition and technology, velocity and the urban landscape, the cinematic eye. Readings: Santos Dumont, Renato Almeida, Oswald de Andrade, Oliverio Girondo, Bicy Casares, Alfonso Reyes, Vicente Huidobro, Horacio Quiroga, Jorge Schwartz.
3-5 units, Win (Giucci)

260. Latin America in the Sixties—Literature, cinema, popular culture, art, music, politics, social movements, and other issues which helped shape Latin America in the '60s. Multimedia resources help portray the complexities of this decade.
3-5 units (Ruffinelli)

261. The Avant Garde in Latin America—Surveys the neglected but increasingly important Avant Garde period of the 1920s and '30s. Readings in
include novels, short stories, manifests, and poetry from Mexico, Argentina, Uruguay, Peru, etc.

3-5 units (Ruffinelli)

262. The Origins of the New Latin American Novel—Several works of the 1920s form the foundation of the contemporary novel and provide a powerful image of Latin America: the "novel of the Land" (Don Segundo Sombra, Doña Barbara, La Vordgine), and the "novel of the City" (Los siete locos, Ifigenia). Close readings survey the 20th century.

3-5 units (Ruffinelli)

263. The Latin American Novel of the '60s: Cortázar, Vargas Llosa, García Márquez—Examination of novels of the "Boom" era by this "generation" of internationally-known writers. Focus is on the construction of the modern canon of the Latin American novel.

3-5 units (Ruffinelli)

264. The Latin American Novel of the '70s: Bryce, P. Rossi, Soriano—Focuses on the post-Boom novel and the struggle for identity by a new generation of writers. The continuation/disruption of the aesthetics of the '60s. Readings: Peri Rossi, Skármeta, Soriano, etc.

3-5 units (Ruffinelli)

265. The Latin American Novel of the '80s

3-5 units (Ruffinelli)

268. A New Literary Genre: Testimony—Latin American literature and politics in light of a new narrative genre in works of Cabezas, Poniatowska, Walsh, etc.

3-5 units (Ruffinelli)

269. Borges—Short stories, poetry, and essays by the Argentinean writer Borges. His works as literature and as a paradigm for the subsequent generation. Utilizes film adaptations of the short stories to make comparisons between two different aesthetic expressions.

3-5 units (Ruffinelli)

CHICANO STUDIES

280. Introduction to Chicano Literature—Selected works by major Chicano writers of the 20th century, including poetry, fiction, and drama. Questions of genre and textual interpretation, emphasizing the socio-historical cultural context of Chicano literature.

3-5 units, Spr (Yarbro-Bejarano)

282. Fiction, Writing, and Reading 4-5 units, Aut (Moraga)

285. Chicana Expressive Culture—Analysis of the expressive culture (visual art, film/video, writings and everyday cultural practice) of Mexican women in the U.S., grounded in an understanding of culture as fluid and dynamic, not static or unchangeable, and shaped by the historical experience of its practitioners rather than existing beyond and above the people. Historical survey of culture as a site of conflict, contradiction, domination/resistance and protest. Internship required. (In English) GER,4c (DR:+)

3-5 units, Win (Yarbro-Bejarano)

286. Chicana/o and Latina/o Theater and Performance—Consideration and rethinking of recent theories of performance and performativity in the context of historical and contemporary Chicana/o theater. Surveys the teatro of the Chicano movement, including El Teatro Campesino, El Teatro de la Esperanza, and other U.S. and Latin-American political theater groups/movements that influenced Chicano teatro and were in turn shaped by Chicano theatrical practices (e.g., The San Francisco Mime Troupe, Augusto Boal, Enrique Buenaventura). The emergence of women's and gay/lesbian voices in the early 80s, and Latina/o theater of the 80s and 90s, including performance works by Marga Gómez, John Leguizamo, Culture Clash, and Carmelita Tropicana.

5 units (Yarbro-Bejarano)

SPECIAL TOPICS

294. Latin American Cinema: The Short Story in Film—Focus is on the genre of Latin American short story and those developments by major writers (Borges, Garca Marquez, Vargas Llosa, Onetti) which encouraged adaptations into film. Short story literary techniques are compared to cinematic techniques.

3-5 units (Ruffinelli)

295. Cinema, Literature, and Politics in Latin America—The relationship between the cinematic arts and politics through films and videos from Cuba, Venezuela, Argentina, Peru, and Mexico. The depiction of issues such as slavery, dictatorship, and liberation movements.

3-5 units (Ruffinelli)

298. Senior Seminar: Pan American Movement—Recommended for students working on honor's theses. At various moments in the history of Latin America, intellectuals have proposed the goal of continental unity. How does the pan-American ideal relate to the simultaneous project of nation-building? Various pan-American visions range from 19th- and early 20th-century leaders and intellectuals (Bolfvar, Bello, Martí, and Vasconcelos) to those of contemporary critics (Rama, Traba, Hénriquez Ureña, Sáldvar, and Pérez Firmat). The role of international organizations such as the OAS and trade blocs such as Mercosur and NAFTA.

3-5 units, Win (Fox)

299. Individual Work—Open to department undergraduates or graduates. May be repeated for credit.

1-12 units, any quarter (Staff)
336. Major Trends in Spanish Poetry: Machado, Jiménez, Lorca—Trends and developments in 20th-century poetry in the context of Restoration Spain (1871-1930) and against the background of the democratic tradition of Spanish liberalism. Emphasis is on close stylistic analysis and such concepts as the Generation of 1898, Modernism, Krausism, pure poetry, and symbolic system. 
3-5 units (Predmore)

337. Ramón del Valle-Inclán—The evolution of the major works of Valle-Inclán from the Sonatas to Tirano Banderas, including the Comedias bárbaras and three of the “esperpentos,” against the background of Restoration Spain. Emphasis is on Valle as a major force in aesthetic innovation and social criticism. 
3-5 units (Predmore)

342. Constructors of Race in 19th-century Latin America—In essays, poetry, and narrative, Latin American authors used different strategies for the elaboration of a cultural identity after Independence. The renegotiations of racial and gender differences within the misreadings of European literary and philosophical traditions. The relationship to contemporary theories of postcolonialism. 
3-5 units, (Aut) (Rosa)

345. Gauchesca Poetry—Focus is on gauchesca poetry, a specialized genre of literature from Argentina and Uruguay which dealt with the subject of the Gaucho and the foundation of nationhood. The masterpiece of the genre, Martín Fierro, by Jose Hernandez, and other works by Hidalgo, Lussich, Ascasubi, E. del Campo. 
3-5 units (Ruffinelli)

358. The Short Novel of the ’60s and ’70s in Latin America—Short novels by Carlos Fuentes, Gabriel García Marquez, José Revueltas, Juan Carlos Onetti, José Donoso, C. Peri Rossi. First published in Latin America during the ’60s and ’70s, they constitute an alternative genre, the “nouvelle,” with specific characteristics. The relationship between the “nouvelle” and other forms such as short-story and novel. 
3-5 units (Ruffinelli)

359. 19th-Century Latin America: Currents and Cross-currents—Intensive 3 weeks of concentrated seminar sessions (González-Stephan, Pratt). Followed optionally by preparation of individual research projects (Pratt). 
3-5 units, Spr (González-Stephan, Pratt)

360. Gender, Race, and Nation in 19th-Century Latin America—Readings of major writers of the
19th century, emphasizing their relationship to projects of nation-building and decolonization.

5 units (Pratt)

361. Latin American Writing, 1900-1945: Dialectics of Cosmopolitanism/Localism—Major women poets, novelists, essayists in dialogue with the major male writers of the same period. Issues of gender and gender symbolization in relation to regionalist, vanguardist, and feminist movements.

5 units (Pratt)

362. Latin American Writing, 1960 to Present: Gender, Authoritarianism, and Resistance—Poetry and fiction by Latin American women writers since WWII. Topics: representations of marginality; the critique of domesticity; proletarian novel and testimonio; discourses of nationality, race, and history; literature of project and survival; women’s responses to military authoritarianism and state terror. Works by Alegría, Barros, Belli, Brunet, Castellanos, Ferré, Garro, Lispector, Menchu, Mercado, Murillo, Peri-Rossi, Poniatowska, Traba, Valenzuela, with readings in history and social analysis.

5 units (Pratt)

363. Third Cinema and After—The New Latin American Cinema and Cine Novo movements. The role of the filmmaker as social theorist, filmmakers’ relation to cosmovisión and other third world intellectuals, and the role of cinema in national liberation struggles. The legacy of these movements in Latin America and elsewhere. Current trends in Latin American cinema, and the revival of the term “Third Cinema” to describe a variety of oppositional film practices worldwide.

3-5 units, Spr (Fox)

369. The U.S.-Mexico Border Region—Interdisciplinary seminar emphasizing recent scholarship in the field of border studies. Topics: the maquiladora industry, cross-border organizing, mass media in the border region, free trade, immigration, and critical theory, arts, and literature about border identities. Readings in Spanish and English.

3-5 units (Fox)

384. Chicana/o Literature: The Body of Cultural Nationalism—Survey of Chicana/o literature for graduate students, focused through representations of the body as the site of contested constructions of cultural and national identity. What is/was the ideal body of the Chicano Movement as represented in cultural nationalist discourses of the 60s and 70s that persist into the 90s? In what relationship do these Chicana/o representations stand to the ideal body of American identity? How are these ideal bodies racially marked? How do they establish normative hierarchies of gender and sexuality? What bodies are excluded as not representing the “nation”? What critiques and representations have put other bodies into circulation, from a position of identification, rejection, or ambivalence vis-a-vis a nationalist or transnationalist project?

3-5 units (Yarbro-Bejarano)

385. Chicana/o Literature: Moraga and Anzaldúa—In-depth textual and contextual analyses of the works of Cherrie Moraga and Gloria Anzaldúa, beginning with This Bridge called my Back. Dissimilarities in their subsequent writing, exploring the concept of “plural lesbianism” within the internally diverse term “Chicana.” Selected texts of Chicana feminist theory and criticism. Seminar/workshop with student presentations of readings and papers. Goal is to produce a paper suitable for publication or presentation at a conference.

3-5 units (Yarbro-Bejarano)

386. Race, Sexuality, Nation—Graduate seminar examines cultural representations by Latinas/os from a variety of media that embody the social constructs of race, gender, sexuality, and nation, critique their exclusionary mechanisms, and/or propose a project of recuperation or redefinition. Texts focus on Latinas/os; students may work with any period, ethnic group (including whiteness), national literature, or medium. Provides a forum for the development of a theoretical model of the interactions of race, gender, sexuality and national identity in cultural representations, and facilitates graduate student professionalization through workshops of essays for publication and/or conference presentation.

3-5 units (Yarbro-Bejarano)

389. Queer Raza—Analysis of representations by Latinas and Latinos of race, ethnicity, sexuality, and identity in a variety of media: writing, visual art, performance, film/video, and music. Seminar members in groups of three present questions to guide discussions. How are the intersections between race and sexuality represented? How is desire racialized in these representations? How do these representations contest the “ideal body” of American and/or Latina/o national identity? What constitutes a queer raza image, sensibility or aesthetic? What is the relationship between queer raza in the U.S. and larger communities and movements? Limited enrollment; application procedure required.

5 units, Aut (Yarbro-Bejarano)

399. Individual Work—Exclusively for departmental graduate students engaged in special work. 1-12 units, any quarter (Staff)

AFFILIATED DEPARTMENT OFFERINGS

See the respective department listings for course descriptions.

DRAMA

177. Playwriting

5 units, Win (Moraga)
SCHOOL OF HUMANITIES AND SCIENCES

355R. Seminar: Radical Latina Scholarship  
3-5 units, Spr (Moraga)

DANCE

42. Dances of Latin America  
1 unit, Aut (Cashion)

43. Afro-Brazilian and Afro-Peruvian Dance  
1 unit, Aut (Cashion)

75. Mexican Dance and Folklore  
2 units, Win (Cashion)

ENGLISH

163C. Chicana Writers  
5 units, Spr (Romero)

HISTORY

162. Introduction to Chicano History and Culture  
5 units, Aut (Camarillo, Moya)

SPECIAL LANGUAGES PROGRAM

174A,B,C. Beginning Quechua  
3 units (Fajardo)

OVERSEAS STUDIES

These courses are approved for the Spanish major and taught at the campus indicated. Students should discuss with their major advisers which courses would best meet educational needs. Course descriptions can be found in the “Overseas Studies” section of this bulletin or in the Overseas Studies Program office, 126 Sweet Hall.

SANTIAGO

101S. Advanced Grammar  
5 units, Aut, Win (Staff)

127S. Theater and Society—(Same Overseas Studies 158S.)  
5 units, Aut (Hurtado)

164S. Chilean Society through Film and Literature  
4-5 units, Aut (Ruffinelli)

165S. Contemporary Chilean Cinema  
1 unit, Aut (Ruffinelli)

290Z. Modernization and Culture in Latin America—(Same as Overseas Studies 120X.)  
5 units, Aut (Subercaseaux)

STATISTICS

Chair: David O. Siegmund  
Associate Professors: Amir Dembo, Trevor J. Hastie, Joseph P. Romano  
Assistant Professors: Jun Liu, Guenther Walther  
Courtesy Professors: Richard A. Olshen, David Rogosa, Neil Risch

The department's goals are to acquaint students with the role played in science and technology by probabilistic and statistical ideas and methods, to provide instruction in the theory and application of techniques that have been found to be commonly useful, and to train research workers in probability and statistics. There are courses for general students as well as those who plan careers in statistics in government, business, industry, and teaching.

The requirements for a degree in statistics are flexible, depending on the needs and interests of the students. Some students may be interested in the theory of statistics and/or probability, whereas other students may wish to apply statistical and probabilistic methods to a substantive area. The department has long recognized the relation of statistical theory to applications. It has fostered this by encouraging a liaison with other departments in the form of joint and courtesy faculty appointments: Economics (Anderson), Education (Olkin, Rogosa, Suppes), Electrical Engineering (Cover), Geological and Environmental Sciences (Switzer), Genetics (Risch), Health Research and Policy (Brown, Efron, Hastie, Johnstone, Moses, Olshen), Mathematics (Dembo), Engineering-Economic Systems and Operations Research (Lieberman), Stanford Linear Accelerator (Friedman). The research activities of the department reflect an interest in both applied and theoretical statistics, and probability. There are workshops in biology-medicine and in environmental factors in health.

In addition to courses for statistics majors, the department offers a number of service courses designed for students in other departments. These tend to emphasize the application of statistical techniques rather than their theoretical development.

The Department of Statistics is well equipped for statistical applications and research in computational statistics. Computer facilities include two DEC station 5000s and an SGI Challenge networked to approximately 25 X-terminals and some PCs and Macintoshes for general research and teaching use. The Mathematical Sciences Library serves the department jointly with the departments of Mathematics and Computer Science.

The department has always drawn visitors from other countries and universities. As a consequence,
there is usually a wide range of seminars offered by both the visitors and our own faculty.

**UNDERGRADUATE PROGRAMS**

**MAJOR**

Students wishing to build a concentration in probability and statistics are encouraged to consider declaring a major in Mathematical and Computational Sciences. This interdepartmental program is administered in the Department of Statistics (Bradley Efron, chair) and provides a core training in mathematics, statistics, computing, and operations research, with opportunities for further elective work and specialization. See the "Mathematical and Computational Science" section of this bulletin.

**MINORS**

The undergraduate minor in Statistics is designed to complement major degree programs primarily in the social and natural sciences. Students with an undergraduate statistics degree should find broadened possibilities for employment. Furthermore, the statistics degree provides valued preparation for professional degree studies of postgraduate academic programs.

The Statistics minor consists of a minimum of six courses with a total of at least 20 units. There are two required courses (8 units) and four qualifying or elective courses (12 or more units).

1. **Qualifying Courses:** at most two of the following courses may be counted toward the six course requirement for the minor: Math. 43; Statistics 110,190.
2. **Required Courses:** Statistics 116 and 200 (or 201). It is recommended that both 200 and 201 be taken, but only one is required.
3. **Elective Courses:** at least one of the elective courses should be a Statistics 200-level course. The remaining two elective courses may also be 200-level courses. Alternatively, one or two elective courses may be approved courses in other departments. Special topics courses and seminars for undergraduates are offered from time to time by the department and these may be counted toward the course requirement. Examples of elective course sequences are:

   - Statistics 202, 203 (204), emphasizing data analysis and applied statistics
   - Statistics 205, 206 (207), emphasizing statistical methodology
   - Statistics 206; Economics 160 (181), emphasizing economic optimization
   - Statistics 206; Psych. 156 (160), emphasizing psychology modeling and experiments
   - Statistics 207; Elect. Engr. 264 (279), emphasizing signal processing
   - Statistics 217; Biology 242 (283), emphasizing genetic and ecologic modeling

**GRADUATE PROGRAMS**

**MASTER OF SCIENCE**

The department requires that the student take 40 units of work from offerings in the Department of Statistics or from authorized courses in other departments. If Ph.D. level statistics courses are included in the program, the total number of units may be reduced. Ordinarily, four or five quarters are needed to complete all requirements.

Each student should fulfill the following requirements for the M.S. degree:

1. Statistics 116, 200, 201, and 217. Courses previously taken may be waivered by the adviser, in which case they must be replaced by other graduate courses offered by the department.
2. Math. 103 or 113 or 115 or 171, and Computer Science 106X (3 units) or 137 (3 units) or 138A. Substitution of other courses in mathematics and computer science may be made with consent of the adviser.
3. At least three additional courses from graduate offerings in the department (202-399). Consent of the adviser is required in order to take more than 6 units of Statistics 260, 390, or 399.
4. Additional units to complete the requirements may be chosen from the list available from the department. Other graduate courses (200 or above) may be authorized by the adviser if they provide skills relevant to statistics or deal primarily with an application of statistics or probability and do not overlap courses in the student's program. There is sufficient flexibility to accommodate students with interests in applications to business, computing, economics, engineering, health, operations research, and social sciences.

Students with a strong mathematical background who may wish to go on to a Ph.D. in Statistics should consider applying directly to the Ph.D. program.

All statistics courses required for the M.S. degree (116, 200, 201, and three additional statistics graduate courses) must be taken for letter grades, and an overall 2.75 grade point average (GPA) is required.

**DOCTOR OF PHILOSOPHY**

The department looks for motivated students who want to prepare for research careers in statistics or probability, either applied or theoretical. Advanced undergraduate or master's level work in mathematics and statistics provides a good background for the doctoral program. Quantitatively oriented students with degrees in other scientific fields are also considered for admission. The program normally takes four years.
Program Summary—Statistics 300A, B, C, 305, 306A, B, and 310 A, B, C (first-year core program); pass two of three parts of the qualifying examination (beginning of second year); breadth requirement (second or third year); University oral examination (end of third year or beginning of fourth year); dissertation (fourth year).

First-Year Core Courses—Statistics 300 systematically surveys the ideas of estimation and of hypothesis testing for parametric and nonparametric models involving small and large samples. 305 is concerned with linear regression and the analysis of variance. 306 surveys a large number of modeling techniques, related to but going beyond the linear models of 305. 310 is a measure-theoretic probability theory, beginning with the basic concepts of analysis.

Qualifying Examinations—These are intended to test the student’s level of knowledge when the first-year program, common to all students, has been completed. There are separate examinations in the three core subjects of statistical methods, mathematical statistics, and probability theory, and all are given at the beginning of the Autumn Quarter of the student’s second year. Students may take two or three of these examinations and are expected to show acceptable performance in two examinations.

Breadth Requirement—In order to appreciate scientific problems, students are required to take 9 units of course work at a graduate or advanced undergraduate level in some other department. These units must be in courses higher than 200. Students with a graduate degree in a scientific area that is not essentially mathematics or statistics are exempted from this requirement.

University Oral Examination—The University oral examination is taken on the recommendation of the student’s research adviser after the thesis problem has been well defined and some research progress has been made. Usually, this happens early in the student’s fourth year. The oral examination consists of a 40-minute presentation on the thesis topic, followed by two question periods. The first relates directly to the student’s presentation and the second is intended to explore the student’s familiarity with broader statistical topics related to the thesis research.

Financial Support—Students accepted to the Ph.D. program are offered financial support. All tuition expenses are paid and there is a fixed monthly stipend determined to be sufficient to pay living expenses. Financial support is continued for four years, department resources permitting, for students in good standing. The resources for student financial support derive from funds made available for student teaching assistantships and research assistantships. Students receive both a teaching and research assignment each quarter which, together, do not exceed 20 hours. Students are strongly encouraged to apply for outside scholarships, fellowships, and other forms of financial support.

Ph.D. MINOR

The Department of Statistics will devise individual Ph.D. minor programs, but the department urges all graduate students in other fields who wish to have a subspecialty in statistics to study for an M.S. degree instead. The unit requirement for an M.S. degree is 40 units, whereas the number of units required for a minor averages around 30. This difference of 10-12 units can be made up by the student by including in the M.S. program courses from his or her own field which are related to statistics or applications of statistics.

COURSES INTRODUCTORY

Introductory courses for general students with an interest in the problems of descriptive statistics and statistical inferences are Statistics 40, 50, 60, 61. These courses have no mathematical prerequisites. Statistics 40, 50, and 60 are certified to meet the General Education Requirement in Mathematics for undergraduates. Statistics 40 and 50 are Stanford Introductory Seminars offering introductions to particular topics in a small group format with a preference to freshmen. The sequence 60, 61 emphasizes the techniques and methods of statistical inference.

Statistics 110, 116, 190, 200, 217-218 are introductory but have a calculus prerequisite. Statistics 110 (which builds on 116) covers the most important techniques used in the analysis of experimental data in engineering and science. Statistics 190 is a post-calculus course in statistics specifically designed for economists, psychologists, sociologists, and other social science majors. Statistics 116 provides a general introduction to the theory of probability. It may be followed by 200, which deals with statistical theory, or by 217 and 218, which deal with stochastic processes. The sequence 116, 200 is a basic two-quarter sequence in mathematical statistics; the sequence 116, 217, 218 is a basic one-year course in probability theory.

40. Stanford Introductory Seminar: Chance—Preference to freshmen. Nonmathematical introduction to statistical methods in the context of applications and current newspaper accounts. Students learn basic statistical techniques encountered in media reports, explore fallacies, and critically discuss assumptions underlying reported conclusions, making them informed and critical participants in the information age. GER: 2c (DR: 4)

3 units, Win (Switzer)

50. Stanford Introductory Seminar: Mathematics in Sports—Preference to freshmen. The math-
emathematical and physical foundations of various sports are developed to provide new statistics, interpret old statistics, and suggest new physical and strategic approaches. Extremes are examined to find the optimum. Some game theory and assessment of odds. The extent to which all sports are equally exciting. Skill vs. luck. The mathematics are followed as necessary to reach the desired conclusions. Recommended: mathematical aptitude. GER:2c (DR:4)

3 units, Spr (Cover)

60. Introduction to Statistical Methods: Precalculus—(Graduate students register for 160; same as Psychology 10.) A nonmathematical study of statistical methods. Emphasis is on statistical techniques. Organization of data, averages, variability, and association. Statistical inference, test of hypotheses, estimation, and confidence intervals. Computer statistical packages are used. GER:2c (DR:4)

5 units, Aut (Walther)
Win (Sen)
Spr (Thomas)
Sum (Staff)

61. Introduction to Statistical Methods II—(Graduate students register for 161.) Chi-square tests, analysis of variance, regression, correlation, non-parametrics, sample surveys, elementary design of experiments. Prerequisite: 60 or consent of instructor.

5 units, Win (Olkin)

105. Stanford Introductory Dialogue: Statistical Design of Experiments in Extrasensory Perception—Preference to sophomores. The principle of good and bad experimental designs and how experimental data is used to reach conclusions. Randomization, experimental control, efficient design, elementary probability, statistical inference, quantification of uncertainty.

3 units, Spr (Switzer)

110. Statistical Methods in Engineering and the Physical Sciences—Introduction to applied statistics for engineers and physical scientists. Topics: descriptive statistics, point and interval estimation, tests of hypotheses, nonparametric methods, curve fitting by least squares, analysis of variance, elementary experimental design. Prerequisites: 116 or equivalent, and one year of calculus. GER:2c (DR:4)

4 units, Aut (Hastie)
Sum (Staff)


3-5 units, Aut (Romano)
Win, Sum (Staff)
Spr (Lai)

152. Introduction to Optimization—(Enroll in Engineering 62.)
4 units, Aut, Spr (Staff)

4 units, Win (Staff)

160. Introduction to Statistical Methods: Precalculus—See 60. For graduate students.
5 units, Aut (Walther)
Win (Sen)
Spr (Thomas)
Sum (Staff)

161. Introduction to Statistical Methods II—See 61. For graduate students.
5 units, Win (Olkin)

190. Introduction to Statistical Methods (Postcalculus) for Social Scientists—(Same as Economics 80.) Introduction to statistical methods relevant to the social sciences. Emphasis is on description and examples of the use of statistical techniques. Probability: basic rules of probability, conditional probability, Bayes’ rule, discrete and continuous probability distributions. Statistical inference: point estimation, tests of hypotheses, confidence intervals, large-sample methods. Data analysis: linear regression techniques and diagnostics. Statistical computer packages (e.g., MINITAB) are used for inference and data analysis. Autumn, section 2, (Switzer) uses Web based tools; limited enrollment. See www.stat/teaching/stat!90/. Prerequisites: Math. 41 or equivalent, consent of instructor. GER:2c (DR:4)

3-5 units, Aut (Bloch, Switzer)
Win (Ryu)
Spr (Donaldson)

199. Independent Study—For undergraduates. (Staff)


3 units, Aut (Lai)
Spr (Hochster)

CONTINUATION

Courses in this category have been designed for particular use in applications. Generally, they have introductory statistics or probability as prerequisites.
201. Statistical Methods—For the mathematically well-qualified student; moves quickly, covering descriptive statistics, tests of hypotheses, comparison of two samples, the binomial distribution, nonparametric methods, regression correlation, and elements of the analysis of variance. Can be followed by 202 or 203 (or both in any order). Prerequisite: 116 or equivalent.

3 units, Win (Walther)

202. Data Analysis—Elements of modern data analysis. Possible topics: bootstrap and jackknife methods for assessing variability, cross-validation, smoothing procedures and density estimation, multiple linear regression and variable selection, data transformation, nonlinear regression. Emphasis is on conceptual rather than theoretical understanding. Prerequisite: 201 or equivalent.

3 units, Spr (Walther)

203. Introduction to Regression Models and the Analysis of Variance—The most widely used statistical techniques; interpretation of observational data and empirical model building. Topics: simple and multiple linear regression, nonlinear regression, analysis of residuals and model selection, design of one-way and two-way factorial experiments, fixed effects and random effects models. Prerequisite: 200 or 201.

3 units, Aut (Chen)

204. Sampling from Finite Populations—The theory of sampling from finite populations. Simple random sampling, stratified sampling, cluster sampling, efficiency of various designs, nonresponse models; emphasis on applications. Prerequisite: a basic course in statistics (61, 110, or 200).

3 units, Aut (Donaldson)

205. Introduction to Nonparametric Statistics—Nonparametric analogs of the one- and two-sample t tests and analysis of variance; the sign test, median test, Wilcoxon’s tests, and the Kruskal-Wallis and Friedman tests, tests of independence. Nonparametric confidence interval estimates. Pre- or corequisite: 200.

3 units, not given 1997-98

206. Applied Multivariate Analysis—Introduction to the statistical analysis of several quantitative measurements on each observational unit. Emphasis is on concepts, computer-intensive methods. Examples from economics, education, geology, psychology. Topics: multiple regression, multivariate analysis of variance, principal components, factor analysis, canonical correlations, multidimensional scaling, clustering. Prerequisite: 200 or 201; concurrent registration in 200 is permitted.

3 units, Spr (Oman)

207. Introduction to Time Series Analysis—Time series models used in economics, engineering, physics, geology, etc. Trend fitting, autoregressive schemes, moving average models, periodograms, second order stationary processes, spectral analysis. Prerequisites: 116 and a basic course in statistics (200 or 201A).

3 units, not given 1997-98

208. Introduction to the Bootstrap—The bootstrap is a computer-based method for assigning measures of accuracy to statistical estimates. By substituting computation in place of mathematical formulas, it permits the statistical analysis of complicated estimators. Topics: nonparametric assessment of standard errors, biases, and confidence intervals; related resampling methods including the jackknife, cross-validation, and permutation tests. Theory and applications. Prerequisite: at least one course in statistics or probability.

3 units, not given 1997-98

211. Statistical Methods for Meta-Analysis—(Same as Education 493B, Health Research and Policy 206.) Meta-analysis is a quantitative method for combining results of independent studies, and enables researchers to synthesize the results of related studies so that the combined weight of evidence can be considered and applied. Examples from the medical, behavioral, and social sciences. Topics: literature search, publication and selection bias, statistical methods (contingency tables, cumulative methods, sensitivity analyses, non-parametric methods). Project required. Prerequisites: basic sequence in statistics and consent of instructor.

1-3 units, Win (Olkin)


3 units, not given 1997-98


3 units, Aut (Romano)


3 units, Win (Romano)

BOOTSTRAP AND SAMPLE REUSE METHODS. DENSITY ESTIMATES: KERNEL DENSITY ESTIMATION; BIAS VS. VARIANCE TRADEOFF; CHOICE OF BANDWIDTH AND KERNEL. TIME SERIES: FIRST- AND SECOND-ORDER AUTOREGRESSIVE PROCESSES; CONDITIONS FOR STATIONARITY; USE OF MAXIMUM LIKELIHOOD IN TIME SERIES WITH ASYMPTOTIC THEORY. POSSIBLE TOPICS: SEQUENTIAL ANALYSIS, OPTIMAL EXPERIMENTAL DESIGN, EMPIRICAL PROCESSES WITH APPLICATIONS TO STATISTICS, EDGEPHOR EXPANSIONS WITH APPLICATIONS TO STATISTICS.

300A. 3 UNITS, AUT (SIEGMUND)
300B. 3 UNITS, WIN (DONOHO)
300C. 3 UNITS, SPR (DONOHO)

305. INTRODUCTION TO STATISTICAL MODELING—DESCRIPTIVE STATISTICS. EFFECTS OF CORRELATION, NONNORMALITY, AND HETEROSCEDASTICITY ON ONE AND TWO SAMPLE T TESTS. LINEAR MODELS: SIMPLE LINEAR REGRESSION, CORRELATION, ONE WAY ANOVA, MULTIPLE COMPARISONS, THE GENERAL LINEAR MODEL, TESTING NESTED MODELS, REGRESSION DIAGNOSTICS, WEIGHTED LEAST SQUARES, BLOCKING RANDOM EFFECTS, TWO WAY ANOVA, MIXED EFFECTS, CALIBRATION, PREDICTION, CONFIDENCE BANDS, LACK OF FIT AND PURE ERROR SUMS OF SQUARES, CONTRASTS, GAUSS-MARKOV THEOREM, POLYNOMIAL REGRESSION, ORTHOGONAL SERIES REGRESSION, TRANSFORMATIONS, DUMMY VARIABLES, MODEL SELECTION, PARTIAL CORRELATION, MODELING HETEROSEDASTICITY. EMPHASIS IS ON PROBLEM SETS INVOLVING SUBSTANTIAL COMPUTATIONS AND REALISTIC DATA. PREREQUISITES: 200, COMPUTER SCIENCE 106A, MATH. 113, OR CONSENT OF INSTRUCTOR.

305A. 3 UNITS, AUT (LORENZ)
305B. 3 UNITS, WIN (LORENZ)
305C. 3 UNITS, SPR (LORENZ)

300A, B, C. WORKSHOP IN BIOSTATISTICS.—SAME AS HEALTH RESEARCH AND POLICY 260A, B, C. PRIMARILY FOR DOCTORAL STUDENTS IN STATISTICS. APPLICATIONS OF STATISTICAL TECHNIQUES TO CURRENT PROBLEMS IN MEDICAL SCIENCE. ENROLLMENT FOR MORE THAN 2 UNITS OF CREDIT INVOLVES EXTRA READING OR CONSULTING AND REQUIRES CONSENT OF THE INSTRUCTOR.

260A. 3 UNITS, AUT (LUENBERGER)
260B. 3 UNITS, WIN (LUENBERGER)
260C. 3 UNITS, SPR (LUENBERGER)

240. VECTOR SPACE OPTIMIZATION.—(ENROLL IN ENGINEERING ECONOMIC SYSTEMS AND OPERATIONS RESEARCH 313.)

3 UNITS, AUT (LUENBERGER)

300A, B, C. THEORY OF STATISTICS—ELEMENTARY FINITE SAMPLE THEORY OF POINT ESTIMATION: STATISTICAL MODELS; SUFFICIENCY; APPLICATIONS TO EXponential FAMILIES, GROUP FAMILIES, AND NONPARAMETRIC FAMILIES; MINIMUM RISK UNBIASED ESTIMATION; MINIMUM RISK EQUIVARIANT ESTIMATION; CRAMÉR-RAO INEQUALITY. ELEMENTARY DECISION THEORY: LOSS AND RISK FUNCTIONS, BAYES ESTIMATIONS; MINIMUM ESTIMATION; SHRINKAGE ESTIMATORS. LARGE SAMPLE ESTIMATION THEORY: ASYMPTOTIC EFFICIENCY, MAXIMUM LIKELIHOOD ESTIMATION, DELTA METHOD, ASYMPTOTIC DISTRIBUTION OF QUANTILES AND TRIMMED MEANS, DIFFERENTIABILITY OF STATISTICAL FUNCTIONALS ROBUSTNESS AND INFLUENCE. HYPOTHESIS TESTING AND CONFIDENCE INTERVALS: NEYMAN-PEARSON THEORY; UNIFORMLY MOST POWERFUL TESTS AND UNIFORMLY MOST ACCURATE CONFIDENCE INTERVALS FOR DISTRIBUTIONS WITH MONOTONE LIKELIHOOD RATIO; SYSTEMATIC USE OF SUFFICIENCY AND CONDITIONING TO ELIMINATE NUISANCE PARAMETERS IN EXPERIMENTAL FAMILIES; USE OF INVARIANCE TO ELIMINATE NUISANCE PARAMETERS IN GROUP FAMILIES; ASYMPTOTIC THEORY OF LIKELIHOOD RATIO TEST; PITMAN ASYMPTOTIC EFFICIENCY; RANK PERMUTATION AND RANDOMIZATION TESTS; JACKKNIFE, BOOTSTRAP AND SAMPLE REUSE METHODS. DENSITY ESTIMATION: KERNEL DENSITY ESTIMATION; BIAS VS. VARIANCE TRADEOFF; CHOICE OF BANDWIDTH AND KERNEL. TIME SERIES: FIRST- AND SECOND-ORDER AUTOREGRESSIVE PROCESSES; CONDITIONS FOR STATIONARITY; USE OF MAXIMUM LIKELIHOOD IN TIME SERIES WITH ASYMPTOTIC THEORY. POSSIBLE TOPICS: SEQUENTIAL ANALYSIS, OPTIMAL EXPERIMENTAL DESIGN, EMPIRICAL PROCESSES WITH APPLICATIONS TO STATISTICS, EDGEPHOR EXPANSIONS WITH APPLICATIONS TO STATISTICS.
ergodic theory, exchangeability, etc. 310A covers measure and integration, and weak convergence of measures. Prerequisites: 116, Math. 115.

**310A. 3 units, Aut (Dembo)**

**310B. 3 units, Win (Dembo)**

**310C. 3 units, Spr (Lai)**

**314. Matrix Theory and Inequalities—**(Same as Math. 252A.)

*3 units, not given 1997-98*

**315A,B,C. Modern Applied Statistics: Learning, Mining, and Sampling—**The rise in computing power has accompanied a rapid growth in statistical modeling and data analysis. New techniques bridge the gap between statistics, computer science, and artificial intelligence. Series covers new methods, emphasizing statistical methodology.

**315A. Learning—**Learning refers to estimating models from data, in particular, models for regression and classification. Linear regression models with recent advances to deal with large numbers of variables and model selection. Nonparametric regression methods, smoothing techniques, additive models, projection pursuit, MARS, local regression and neural networks. Linear classification techniques, discriminant analysis and logistic regression, nonparametric versions of these, naive Bayes, mixture models, and radial basis functions.

*3 units, Aut (Hastie)*

**315B. Data Mining—**Data mining is used to discover patterns and relationships in data, with an emphasis on large observational data bases. It sits at the common frontiers of statistics, database management, machine learning, and data visualization. From a statistical perspective, it is viewed as computer automated exploratory analysis of (usually) large complex data sets. Topics: classification, association rules, decision trees, covering algorithms, example based methods clustering, and visualization.

*3 units, Win (Friedman)*

**315C. Sampling—**Issues that arise when one can generate or choose the data to use. Aspects of sampling, experimental design, numerical integration, computer experiments, sample reuse (bootstrap and cross-validation). Computer experiments explore and visualize models from learning theory. Sampling reduces the volume of a data set in order to apply a learning method. Sample reuse estimates the error in a learning method. Simulation experiments compare competing learning methods.

*3 units, Spr (Owen)*


*3 units, Aut (Lai)*

**319. Literature of Statistics—**Literature study of topics in statistics and probability culminating in oral and written reports.

*3 units, Aut (Liu)*

**Win, Spr (Olshen)**


*3 units, not given 1997-98*

**323. Wavelets and Beyond, with Applications—**New representations have been proposed for signals and images, e.g., wavelets, wavelet packets, and cosine packets. How these representations are constructed, comparing their special features. The range of potential applications (data compression, feature extraction, pattern classification), and newer representation tools, e.g., noiselets, brushlets, ridgelets, etc.

*3 units, Spr (Chui, Donoho)*


*3 units, not given 1997-98*

**326. Sequential Analysis—**The Wald sequential probability ratio test, operation characteristics, and applications. General theory of optimal stopping with applications to sequential statistical decision problems.

*3 units, not given 1997-98*

**332. Asymptotic Methods in Statistics—**Concepts of efficiency, the asymptotic efficiency of maximum likelihood estimators, best asymptotically normal (BAN) estimators, asymptotic behavior of likelihood ratio tests, optimal designs, empirical Bayes methods.

*3 units, not given 1997-98*

340. Experimental Design—For graduate students in science, engineering, and statistics. Emphasis is on how and why do experiments, and analyzing and presenting the results. Topics: control groups, analysis of variance, blocking and balance, factorial experiments, fractional factorials, screening designs, response surfaces, binary outcomes, Taguchi methods, computer experiments. Prerequisite: 116. Recommended: experience with experimentation or data analysis.

3 units, not given 1997-98


3 units, not given 1996-97

344A. Genetic Epidemiology—(Same as Genetics 344A.) Methods for the design and analysis of studies in human genetics focusing on the epidemiology of Mendelian disorders and the genetic and environmental contributions to common, complex familial traits. Topics: study designs for assessing the importance of genetic factors (family, twin, and adoption studies); methods for determining modes of inheritance (segregation analysis); identification and mapping of major genes through linkage analysis and disease-marker associations. Applications to birth defects, coronary heart disease, psychiatry, neurology, cancer, and immunology.

3 units, Win (Risch)

344B. Topics in Statistical Genetics—(Same as Genetics 344B.) In-depth discussion of statistical methods currently used in human genetic analysis. Topics depend on interests of the students and instructors: concepts of likelihood as used in the genetic context; measures of familial aggregation, including issues of censoring and age-dependent data; genetic modeling of quantitative traits; mode of inheritance analysis, including segregation analysis; analysis of extended pedigrees; parametric and nonparametric approaches to linkage analysis and gene mapping, including family studies, radiation hybrid data, sperm typing, and DNA contig mapping; linkage disequilibrium; analysis of DNA profiles for individual identification; DNA sequence analysis.

3 units, not given 1997-98

352. Spatial Statistics—Summary statistics, probability models, smoothing and interpolation, classification, sampling design, applications to remote sensing and environmental monitoring.

3 units, not given 1997-98


3 units, not given 1997-98


3 units, Win (Romano)


3 units (Bambos)

alternate years, given 1997-98


3 units, Win (Glynn)

371. Bayesian Modeling and Computations—Bayesian methods treat unknowns as random variables and are coherent and flexible. Basic Bayesian models, whose answers often appear similar to classical answers. Complicated hierarchical and mixture models with nonstandard solutions. Methods for model checking, sensitivity analysis, and predictions. Emphasis is on drawing inferences via computer simulation. Mathematical analysis discussion.

3 units, not given 1997-98

372. Graphical Models and Bayesian Network—Using graphs to represent statistical models (the associational and casual relations between random variables under study) enables concise representations, easy interpretation, and computationally feasible incorporation of new information. Emphasis is on Bayesian inference using these graphical models, e.g., Bayesian networks. Topics: basic graph
theory, graphical Gaussian models, log linear models, expert systems, missing data problems, and genetic modeling. Computational issues and their applications to artificial intelligence.

3 units, Aut (Liu)

374. Large Deviations—(Enroll in Math. 234.)
3 units, Aut (Dembo)

376A. Information Theory—(Same as Electrical Engineering 376A.) Information theory and statistics. The extreme points of communication theory: data compression to the entropy limit, and communication at the channel capacity limit, Kolmogorov complexity, Shannon entropy. Rate distortion theory. Huffman coding and random coding. Unified treatment based on the asymptotic equipartition theorem. Prerequisite: 116 or Electrical Engineering 278, or equivalent.

3 units, Win (Cover)

376B. Information Theory—(Enroll in Electrical Engineering 376B.)
3 units, alternate years, given 1998-99

390. Consulting Workshop—Provides skills required of practicing statistical consultants and exposure to wide range of statistical applications. Students participate as consultants in the department’s drop-in consulting service, analyze client's data, and prepare formal written reports. Seminar provides supervised experience in short term consulting. Prerequisites: course work in applied statistics or data analysis, and consent of the instructor.

3 units, Aut, Win (Owen)

Spr (Oman)

399. Research—Research work as distinguished from independent study of nonresearch character listed in 199.
(Staff)

PROGRAM IN STRUCTURED LIBERAL EDUCATION

Director and Professor: Mark Mancall (History)
Lecturers: Andrew Aisenberg, Suzanne Greenberg, Diana Maltz, Jonathan Reider, Jean Roth, Irena Smith
Coordinator: Suzanne Greenberg

The Program in Structured Liberal Education (SLE) is designed specifically for freshmen interested in an interdisciplinary approach to the liberal arts and sciences. The program emphasizes intellectual rigor and individualized contact between faculty and students. SLE has three basic purposes: to present a coherent program of instruction; to develop the student’s ability to ask effective questions of texts, teachers, the culture, and themselves; and to develop intellectual skills in logical reasoning, critical reading, expository writing, and group discussions.

SLE stresses inquiry, criticism, and a tolerance for ambiguity. Neither the faculty nor the curriculum provides "ready-to-serve" answers to the questions being dealt with; rather, SLE encourages a sense of intellectual challenge, student initiative, and originality.

APPLICATION

Freshmen should apply during the summer preceding the academic year in which they will enroll.

SLE is designed as a three-quarter sequence and students applying should be willing to make a commitment for the entire year.

Correspondence regarding the program should be addressed to Program in Structured Liberal Education, Florence Moore Hall, Stanford University, Stanford, California 94305.

COURSES

SLE is a demanding program which consumes approximately 60 percent of the average academic workload first-year students usually carry. Autumn Quarter concentrates on ancient Greece, Israel, and India. Winter Quarter examines the religious, ideological, and aesthetic transformations that occurred in Europe, Asia, and the New World as a result of the Middle Ages, Renaissance, Scientific Revolution, and Enlightenment. Spring Quarter focuses on the social, political, and artistic forces that shape the modern world. Completion of the SLE program satisfies the Area One Requirement, the University Writing Requirement, and one General Education Requirement in the humanities.

91. 9 units, Aut (Staff)
92. 9 units, Win (Staff)
93. 9 units, Spr (Staff)

PROGRAM IN SYMBOLIC SYSTEMS

Director: Thomas Wasow (Linguistics and Philosophy)
Program Coordinator: Avrom Faderman
Program Committee: James Greeno (Education), Daphne Koller (Computer Science), Paul Skokowski, Kenneth Taylor (Philosophy), Barbara Tversky (Psychology)
Program Faculty: Michael Bratman (Philosophy), Joan Bresnans (Linguistics), Christopher Chafe (Music), Eve Clark (Linguistics), Herbert H. Clark (Psychology), Fred Dretske (Philosophy), John Etchemendy (Philosophy), Solomon Feferman (Mathematics and Philosophy), Anne Fernald (Psychology), John Gabrieli (Psychol-
Computer systems, robots, and people are all examples of symbolic systems, agents that use language to represent the world around them so as to communicate and generally act intelligently. The notions of symbol, representation, information, and action are at the heart of the study of symbolic systems. This common core of notions arises in a variety of fields including artificial intelligence, computer science, cognitive psychology, linguistics, philosophy, and symbolic logic. In recent years, though, a new discipline has begun to emerge from research collaborations across these traditional disciplines, addressing questions such as: In what ways are computers and computer languages like humans and their languages? How can the interaction between humans and computers be made easier and more productive? What would it take to build a computer that thinks?

The Symbolic Systems Program (SSP) offers an opportunity to focus on these issues. Majors must take courses in the departments of Computer Science, Linguistics, Philosophy, and Psychology, as well as courses designed specifically for the program. The goal is to prepare students with the vocabulary, theoretical background, and technical skills to understand and participate in contemporary interdisciplinary research into questions about language, information, and intelligence—both human and machine. The curriculum offers traditional humanistic approaches to these questions as well as a training in, and familiarity with, contemporary developments in the science and technology of computation.

A degree in Symbolic Systems prepares students for advanced training in the interdisciplinary study of language and information, or for postgraduate study in any of the contributing disciplines. It is also excellent preparation for employment immediately after graduation.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

The program leads to a B.S. in Symbolic Systems. The curriculum provides students with a core of concepts and techniques from computer science, linguistics, logic, philosophy, and cognitive psychology, drawing on faculty and courses from various departments.

Symbolic Systems majors must complete a core of required courses plus a concentration consisting of five additional courses. All major courses are to be taken for letter grades unless an approved course is offered Satisfactory/No Credit only. The core requirements are:

1. Cognition:
   a) Psychology 40, Introduction to Cognitive Psychology
   b) One Psychology course from: 30, Introduction to Perception; 50, Introduction to Human Neuropsychology; 131, Language and Thought; 141, Cognitive Development

2. Computation and Artificial Intelligence:
   a) Computer Science 106B, Programming Abstractions, or 106X, Programming Methodology and Abstractions
   b) Computer Science 109, Introduction to Computer Science
   c) Computer Science 121 or 221, Introduction to Artificial Intelligence

3. Philosophical Foundations:
   a) Philosophy 80, Mind, Matter, and Meaning
   b) One Philosophy course from: 181, Philosophy of Language; 184, Theory of Knowledge; 186, Philosophy of Mind

4. Language:
   a) Linguistics 120, Introduction to Syntax
   b) Linguistics 130, Introduction to Semantics and Pragmatics, or 230A, Semantics and Pragmatics

5. Logic:
   a) Philosophy 160A, First Order Logic
   b) Philosophy 160B, Computability and Logic; or Computer Science 154, Introduction to Automata and Complexity Theory; or 254, Automata, Languages, and Computability

6. Mathematics: one approved course on a mathematical topic other than calculus.

7. Senior Seminar: Symbolic Systems 201

Students select concentrations from the list below or design others in consultation with their advisers.

Applied Logic
Artificial Intelligence
Cognition
MINORS

Students may minor in Symbolic Systems by completing either item '1' or '2' below.
1. By completing one course in each of the specified core areas:
   a) Artificial Intelligence: Computer Science 121 or 221
   b) Computer Science: Comp. Sci. 109
   c) Linguistics: Ling. 120 or 130
   d) Logic: Philosophy 159 or 160A, or Computer Science 154
   e) Philosophy: Phil. 80, 181, 183, 184, or 186
   f) Psychology: Psych. 30, 40, 50, 131 or 141
2. By completing SSP 200 or Psychology 200, plus an interdisciplinary SSP concentration listed in the program booklet (available from the program office, or on the SSP Web page, http://www-leland.stanford.edu/dept/symbol/). To qualify, the selection of courses used for the minor must be interdisciplinary: that is, it must either include courses from at least three departments, or include more than one course from each of two departments.

DIRECTED RESEARCH AND SENIOR HONORS

The program strongly encourages all SSP majors to gain experience in directed research by participating in faculty research or by pursuing independent study. Several avenues are offered.
1. Summer Internships: students work on SSP-related faculty research projects.
2. Independent Study: under faculty supervision, students work on independent projects. For course credit they may enroll in Symbolic Systems 199.
3. Senior Honors: under faculty supervision, students pursue extended research projects and complete a senior honors dissertation. Contact SSP for more information on any of these options. In addition, the Undergraduate Research Opportunities office on campus offers numerous grants and scholarships supporting student research projects at all levels.

COURSES

CORE

30. Introduction to Perception—(Enroll in Psychology 30.)
   3 units, Spr (Heeger)

40. Introduction to Cognitive Psychology—(Enroll in Psychology 40.)
   4 units, Win (B. Tversky)

50. Introduction to Human Neuropsychology—(Enroll in Psychology 50.)
   4 units, Win (Gabrieli)

80. Mind, Matter, and Meaning—(Enroll in Philosophy 80.) (WIM)
   5 units, Win (Taylor)

106B. Programming Abstractions—(Enroll in Computer Science 106B.)
   5 units, Aut (Staff)
   Win (Roberts)
   Spr (Plummer)

106X. Programming Methodology and Abstractions (Accelerated)—(Enroll in Computer Science 106X.)
   5 units, Aut (Plummer)
   Win, Spr (Staff)

109. Introduction to Computer Science—(Enroll in Computer Science 109.)
   4 units, Aut (Johnson)

120. Introduction to Syntax—(Enroll in Linguistics 120.)
   4 units, Aut (Sag, Wasow)

121. Introduction to Artificial Intelligence—(Enroll in Computer Science 121.)
   3 units, Spr (Nilsson)

130. Introduction to Semantics and Pragmatics—(Enroll in Linguistics 130.)
   4 units, Win (Beaver)

131. Language and Thought—(Enroll in Psychology 131.)
   4 units, Aut (Arnold)

154. Introduction to Automata and Complexity Theory—(Enroll in Computer Science 154.)
   4 units, Win (Pratt)
   Spr (Motwani)

160A. First-Order Logic—(Enroll in Philosophy 160A.)
   4 units, Win (Veltman)

160B. Computability and Logic—(Enroll in Philosophy 160B.)
   4 units, Spr (Feferman)

181. Philosophy of Language—(Enroll in Philosophy 181.)
   4 units, Spr (Taylor)

184. Theory of Knowledge—(Enroll in Philosophy 184.)
   4 units, Win (Strevens)

186. Philosophy of Mind—(Enroll in Philosophy 186.)
   4 units, not given 1997-98
201. Senior Seminar—Core seminar for program majors. Integrates themes from core course work with contemporary cross-disciplinary research in learning, computation, and formal systems.
   2 units, Spr (Faderman)

220A. Introduction to Syntactic Theory—(Enroll in Linguistics 220A.)
   4 units, Aut (Sells)

221. Artificial Intelligence: Principles and Techniques—(Enroll in Computer Science 221.)
   3 units, Aut (Koller)

230A. Introduction to Semantics and Pragmatics—(Enroll in Linguistics 230A.)
   4 units, Win (Peters)

RESEARCH

190. Senior Honors Tutorial—Under the supervision of the honors faculty adviser, students work on their senior honors project.
   1-5 units, any quarter (Staff)

191. Senior Honors Seminar—Under the leadership of the Symbolic Systems program coordinator, students meet, discuss, and present their honors project.
   2 units, Win, Spr (Staff)

196. Independent Study—Independent work under the supervision of a faculty member.
   1-15 units, any quarter (Staff)

OTHER PROGRAM COURSES

192B. The Power of Cooperation—Cooperating individuals solve problems faster and better than a single person or the same group of individuals working in isolation from each other. Such belief underlies the founding of the firm, the existence of communities of practice, and the establishing of groups charged with solving hard problems. The performance enhancement that results from cooperation among individuals, and its dynamical consequences for the community. Social and organizational examples where cooperation is present, and the pitfalls encountered in large and anonymous groups. Analytical theories of how performance is enhanced when groups of individuals solve complex problems, and the evolution of the community's structure as the members of group learn and specialize.
   3 units, Aut (Huberman)

200. Symbolic Systems Seminar—(Same as Education 120.) Interdisciplinary topics in cognitive science, (e.g., modularity, representation, reasoning, situated action, or creativity.) Prerequisites: Computer Science 109, Linguistics 120 or 130, Philosophy 80, Psychology 40.
   3 units, Win (Greeno, Wasow)

AFFILIATED DEPARTMENT OFFERINGS

Listed below are a sample of other courses, some of which can be used as part of the student's concentration (see SSP booklet), or may be of special interest to SSP majors. The list is not exhaustive. Students should consult course listings in the related departments for additional courses and information.

ANTHROPOLOGY

5. The Biology and Evolution of Language not given 1997-98

COMMUNICATION

169. Computers and Interfaces: Psychological and Social Issues
   Win (Nass)

COMPUTER SCIENCE

150. Introduction to Computer Theory for Non-CS Majors
   Spr (Staff)

201. Computers, Ethics, and Social Responsibility
   Win (Roberts)

223A. Introduction to Robotics
   Win (Khatib)

229. Machine Learning
   Spr (Koller)

377. Topics in Human-Computer Interaction

   Win (Winograd)

547. Human-Computer Interaction Seminar
   Aut, Win, Spr (Winograd)

EDUCATION

224. Information Technology in the Classroom
   Win (Staff) not given 1997-98

255. Human Abilities—(Same as Psychology 133.)
   Win (Snow)

LINGUISTICS

35Q. Stanford Introductory Seminar: Computers and Human Language
   Aut (Hubbard, Kay)

105. Phonetics
   Win (Flemming)

110. Introduction to Phonetics and Phonology
   Spr (Flemming)

124A/224A. Introduction to Formal Universal Grammar
   Spr (Bresnan)

138. Topics in Computational Linguistics
   Aut (Kay)
240. Language Acquisition I  
not given 1997-98

MATHEMATICS
161. Set Theory  
Spr (Schwarz)

PHILOSOPHY
60. Introduction to the History and Philosophy of Science—(Same as History and Philosophy of Science 60.)  
Aut (Godfrey-Smith)
159. Basic Concepts in Mathematical Logic  
Aut (Faderman)
164. Central Topics in the Philosophy of Science  
not given 1997-98
169. Intensional Logic  
Spr (van Benthem)
170. Ethical Theories  
Spr (Cohon)
298. Topics in Logic, Language, and Information  
Spr (van Benthem)

PSYCHOLOGY
20. Introduction to Brain and Behavior  
Aut (R. Fernald)
200. Foundations of Cognitive Science  
Win (Rumelhart)
221. Applied Vision and Image Systems  
Win (Wandell)

PROGRAM ON URBAN STUDIES

Director: Leonard Ortolano (Professor of Civil Engineering)
The Committee on Urban Studies: (Chair) Paul Seaver (Professor, History); Albert Camarillo (Professor, History); Paulla Ebron (Assistant Professor, Anthropology, on leave); Richard Ford (Assistant Professor, Law); Luis Fraga (Associate Professor, Political Science); Steven Gorelick (Associate Professor, Geological and Environmental Sciences); Shirley Heath (Professor, English, and Linguistics, on leave); Keith Loague (Associate Professor, Geological and Environmental Sciences); Mil-brey McLaughlin (Professor, Education, on leave); Thomas Nehyba (Assistant Professor, Economics); Karen Sawislak (Assistant Professor, History); Nancy Tuma (Professor, Sociology); Paul Turner (Professor, Art)
Lecturers: Nadinne Cruz, Radford Hall, David Neuman, George Sipel, Michael Smiley, Frederic Stout, Patti Walters
Visiting Associate Professor: Gerald Gast

Urban Studies brings together students, faculty, and outside specialists who are concerned with the people and problems of cities. The program stresses two basic themes: developing a critical understanding of how cities evolve and shape urban life, and developing the practical and analytical tools which can help improve the quality of life. Urban Studies enables undergraduates to examine urban problems through a number of disciplinary lenses and to address these problems in a practical way.

The Urban Studies major examines the city within the broad context of a liberal arts education. It treats urbanism as an interdisciplinary field and encourages students to inquire critically into both the nature of the urban environment and techniques used to modify that environment.

The major prepares students for a variety of careers and advanced academic pursuits. Graduates from the Program on Urban Studies have established careers in architecture, community service, environmental planning, real estate development, urban design, and urban planning. Many have obtained graduate degrees in architecture, urban design, or urban planning from major universities across the country including UC-Berkeley, Harvard, and MIT. A substantial number have opted to take graduate degrees in business, law, and public policy.

Information on graduate programs in urban planning, community organization, and architecture and urban design is available from the program office. This information also details prerequisites for these graduate programs.

UNDERGRADUATE PROGRAMS

All students majoring in Urban Studies must complete the Urban Studies core. Those who wish to specialize in community organization, urban planning, or architecture and urban design complete their majors by meeting the appropriate Option Requirements. Students who wish to concentrate in a different area (for example, health care) must complete the Urban Studies core and design the remaining units with an academic adviser who is a member of the Academic Council.

In all cases, a minimum of 70 units (not counting prerequisites) is required for the major. Courses used to satisfy requirements for the major must be taken for a letter grade.

Students considering the major in Urban Studies should visit the program office in Building 60, room 61B, to meet with the program director.

URBAN STUDIES CORE

Urban Studies majors should take 110, Introduction to Urban Studies, before the end of the Autumn Quarter of their junior year. This course should be taken before Art 280.
Each of the following is required:

110. Introduction to Urban Studies
Art 280. Utopia and Reality in Modern Urban Planning
Soc. 180A, B. Methods for Sociological Research
Soc. 181B. Introduction to Statistical Methods for Sociologists

Students in the Architecture and Urban Design Option may omit Sociology 180A, B and/or 181B.

In that case, those students take additional units from the list of restricted electives listed under the Architecture and Urban Design Option to bring the total number of units in the major to 70.

Select at least one course from each of the following categories:

Urban Policy:
- Pol. Sci. 186. Urban Politics
- Pol. Sci. 192F. Seminar: Politics of Race and Ethnicity in the United States

Urban History:
- Hist. 67S Social Change in Industrializing America: A Case Study of Chicago
- Hist. 152. American Spaces: An Introduction to Material Culture and the Built Environment
- Hist. 164. Introduction to Race and Ethnicity in the American Experience
- Hist. 251A. Undergraduate Colloquium: Poverty and Homelessness in America
- Hist. 269. Undergraduate Colloquium: The African American Community Organizing Tradition

Urban Sociology:
- Am. Stud. 120. Process and Practice of Community Service
- Soc. 140. Introduction to Social Stratification
- Soc. 148. Critical Issues in Asian American Communities
- Soc. 149/249. The Urban Underclass

Urban Anthropology:
- Anthro. 145A. Person, Gender, and Family in Welfare Policy
- Anthro. 159. Urban Culture
- Anthro. 159A. The Multicultural City in Europe
- Ed. 179X. Urban Youth and their Institutions: Research and Practice
- Ling. 159. Language and Youth Culture

Urban Design and Architecture:
- 170. Introduction to Urban Design
- 174. Architectural Design Process

Urban and Environmental Planning:
- Civ. Engr. 171. Environmental Planning Methods
- Geol. & Envir. Sci. 130. Geological and Environmental Sciences 1 (required for students taking the urban planning option)

Although not required to complete the Urban Studies major, a knowledge of calculus provides students with flexibility in selecting courses that meet requirements. In addition, calculus is required for admission to many graduate programs in architecture, city planning, and public policy. The program strongly recommends that all Urban Studies majors take Math. 19, 20, and 21, and Economics 1 during their freshman or sophomore year.

With the exception of the Community Organization option, the major does not include a service-learning requirement. However, all Urban Studies students are encouraged to take service-learning courses. Further details on service-learning are given in the description of the Community Organization option.

COMMUNITY ORGANIZATION OPTION

The curriculum for the option in Community Organization provides a deep understanding of the concept of community and its manifestations in the work of public-sector, private-sector, and voluntary service organizations working at the community and neighborhood level. Individual directed study involves field work with a community organization. Courses concerned with community institutions, social science research methods, and internship learning provide a foundation for the field work; a follow-up course on community service allows students to analyze and communicate results from their field research experience. Students pursuing this option are prepared to enter graduate programs concerned with urban affairs and community service and to work with a variety of community service and development organizations and with agencies of local government.

There are no formal prerequisites. Students are encouraged to pursue introductory courses in economics, calculus, and computers. Students who want the option to pursue a graduate degree in city planning should take Economics 51, Economic Analysis I.

REQUIRED TO COMPLETE THE MAJOR

All students complete the Urban Studies Core. In addition, each of the following is required:

Service Learning Requirement—One course in any department or school that involves a "service-learning" component requiring participation in activities of either a community organization or a local government. Examples of such courses are History 251A (Poverty and Homelessness in America) and Political Science 104 (Seminar: Urban Policy.) The Haas Center for Public Service maintains a complete listing of courses that include a service-learning component. The service-learning requirement can also be met by taking Public Policy 179A, B (Preparation for Internship Learning) and Urban Studies 194 (Directed Individual Study in Community Organization).

Am. Stud. 120. Process and Practice of Community Service
Urbs. 191A. Community Organizing
Urbs. 191B. Community Service Organizations

Select one of the following courses on organization theory:

Soc. 160. Formal Organizations or
Indust. Engr. 100. Organizations: Theory and Management or
Pol. Sci. 107. Organizational Decision Making or

Select one of the following courses on Urban Youth:

Ed. 105. American Education and Public Policy
Ed. 141. Children, Civil Rights, and Public Policy in the U.S.
Hist. 273A. Childhood and Modern American History
Ling. 159. Language and Youth Culture

Select one of the following courses on communications:

Engr. 103. Public Speaking/Presentation Development or
Ctr. for Teach, & Learn. 117. Finding Your Voice: The Art of Effective Public Speaking

* American Studies 120 must be taken after (or at the same time as) meeting the Service Learning Requirement.

RESTRICTED ELECTIVES

The total number of units taken to satisfy the major add up to at least 70; restricted electives are used for this purpose.

Ed. 955. Issues in Leadership
Geol. & Envr. Sci. 130. Environmental Earth Sciences I
Geol. & Envr. Sci. 131. Environmental Earth Sciences II

VIEWED TOGETHER WITH THE URBAN STUDIES CORE, THE COURSES REQUIRED FOR THE ARCHITECTURE AND URBAN DESIGN OPTION ALLOW THE STUDENT TO EXPLORE DESIGN IN THE CONTEXT OF ARCHITECTURAL AND URBAN HISTORY AND IN RESPONSE TO HUMAN NEEDS, SOCIAL CONCERNS, AND CULTURAL VALUES. REQUIRED COURSES FOCUS ON DRAWING AND DESIGN AND ON THE HISTORY OF ARCHITECTURE. TWO OF THE DESIGN COURSES ARE SEQUENCED (Art 60 and 160). THIS OPTION PROVIDES STRONG PREPARATION FOR GRADUATE STUDY IN ARCHITECTURE AND URBAN DESIGN. STUDENTS CONSIDERING PROFESSIONAL STUDY IN ARCHITECTURE ARE STRONGLY ADVISED TO TAKE, IN ADDITION TO THE REQUIRED COURSES, Math. 19, 20, and 21; and Physics 21.

PREREQUISITES

Course No. and Subject
Art 60. Basic Design

REQUIRED TO COMPLETE THE MAJOR

Art 140. Drawing I
Art 160K or 160L. Design I: Intermediate Design
At least two courses on the history of architecture (or architecture and art) offered by the Department of Art (100 level or above). Urban Studies 175 may be used as one of the two required courses.

RESTRICTED ELECTIVES

These elective courses include: any from the Urban Studies core; any 100-level course offered by the Program on Urban Studies; any course listed elsewhere in this section of the Stanford Bulletin under Affiliated Department offerings, any 100-level course offered by the Department of Art in drawing, painting, sculpture, printmaking or design; or courses listed below. Restricted electives are used to bring the total number of units to 70 (not including prerequisites).

Art 173B. Art in Public Spaces
Civ. Engr. 100. Managing Civil Engineering Projects
Civ. Engr. 101A. Structural Systems
Urbs. 170. Introduction to Urban Design
Urbs. 171. Suburbia: New Downtowns of the 21st Century
Urbs. 174. Architectural Design Process

RECOMMENDED ADDITIONAL STUDY

Architecture graduate schools typically require applicants to submit a portfolio of work in the visual arts or design as part of the admissions process. The Urban Studies library contains samples of portfolios from alumni who have successfully gained entrance to graduate programs in architecture and urban design. In addition, many graduate schools of architecture require calculus, physics, and basic computer skills as conditions for admission.

Students seeking exposure to orthographic projection, sectioning, and other aspects of technical drawing should take Mechanical Engineering 103D, Engineering Drawing. Because of the increased use of computers in architecture, some graduate programs in architecture require computer literacy. An introductory course (for example, Computer Science 105A) satisfies this requirement. Students interested in graduate programs in architecture are encouraged to consult with the program director to review information describing graduate programs available in the Urban Studies office. Courses in drafting are available at local community colleges including West Valley College and Foothill College.

SELF-DESIGNED OPTION

Students who wish to concentrate on an area other than Community Organization, Urban Planning, or Architecture and Urban Design must complete the Urban Studies core and design the remaining units (to bring the total to 70 units) with an academic adviser who is a member of the Academic Council. The self-designed portion of the major should concentrate on a particular area of analysis such as health care, education, or urban policy. Proposals should include only courses at the 100 level and must be approved by a subcommittee of the Committee on Urban Studies. Proposals for the self-designed portion of the major should include a course list and a description of how the courses meet the student’s educational objectives. Students pursuing a self-designed option must submit proposals for approval by the Urban Studies Committee by the middle of the second quarter of the student’s junior year. Applications received after that deadline are not considered. Students interested in designing their own option are strongly encouraged to meet with the program director before the end of the first quarter of their junior year.

MINORS

The minor in Urban Studies is designed to accomplish two things. First, it introduces students to how specialists from each of several different disciplines approach the study of cities. Second, it provides students with an opportunity to explore their interests in either of two specialized fields: (1) architecture and urban design, or (2) urban planning. Students must declare the minor no later than the last day of the quarter four quarters before degree conferral.

Students must complete seven courses (for a letter grade):

Urbs 110. Introduction to Urban Studies

One course from each of the following three categories as listed above in the Urban Studies Core:

1. Architecture and Urban Design
   b) One course from those included in the Urban Studies Core course listings for Architecture and Urban Design
   c) One (100 level) course on the history of architecture offered by the Departments of Art, or Urban Studies 175

2. Urban Planning
   a) Geol. and Envir. Sci 130. Environmental Earth Sciences I
   b) Geol. and Envir. Sci. 132. Environmental Earth Sciences III
   c) One course from those included in the Urban Studies Core course listings above for Urban Politics or Econ. 148, Urban Economics
HONORS PROGRAM

The honors program offers qualified students an opportunity to conduct independent research and to write a thesis summarizing the results. The program grants honors at graduation to those students who have successfully completed a thesis of honors quality, attained a 3.5 grade point average (GPA) in their major, and successfully completed all course requirements. Honors students must register for a minimum of 10 units and a maximum of 15 units spread over their senior year. The completed honors thesis must be submitted to the program office by the last week in May before graduation. The program encourages students writing theses linked to community service to apply to the Public Service Scholars Program administered by the Haas Center for Public Service. Students can obtain details regarding honors procedures from the program director.

COTERMINAL PROGRAMS

Undergraduates in Urban Studies may enter coterminal master’s degree programs in a number of departments in the University. In recent years, Urban Studies majors have developed coterminal programs within the departments of Anthropology and Sociology, and the School of Education. Information and applications for the coterminal degree programs are available at the Undergraduate Advising office. Students should discuss the coterminal program with the program director during their junior year.

COURSES

Further descriptions and details of current courses offered by lecturers in the Program on Urban Studies are available prior to each quarter from the program office.

110. Introduction to Urban Studies—Interdisciplinary introduction to the study of cities and urban civilization. The history of urbanization through Lewis Mumford’s The City in History and various disciplinary methodologists comprising the unified field of urban studies (sociology, economics, politics, architecture, urban design, and urban public policy formation).
4 units, Aut (Stout)

133. The Politics of Development—The reality of community development: the tug and pull that cities experience, the interests of developers, and the roles played by various publics. The politics of development deals with values, votes, revenues, conflicts, deals, mistrust, negotiations, and compromise. Tension among environmentalists, developers, and cities, and the effects on cities and the Bay Area in general. Student group project prepares development proposals for Bay Area sites. Required field trip. Prerequisite for Urban Studies majors: 110.
4 units (Sipel) not given 1997-98

138. Managing Local Government—Urban administration using the urban executive as a focal point. Topics: the mission and structure of government; policymaking processes in urban government; the respective roles of legislators and administrators; and the role and function of the city manager. The manager's role as a "change agent" vis-a-vis contemporary urban problems: productivity, declining resources, housing, and transportation. Prominent elected and appointed officials from the area guest lecture. Prerequisite for Urban Studies majors: 110.
4 units, Spr (Sipel)

170. Introduction to Urban Design—Urban design theory and contemporary practice. Critical issues in urban development and conservation. Neighborhood livability, central city revitalization, historic preservation, and regional growth are examined through comparative case studies from N. America and abroad. Projects focus on neighborhood, downtown, and regional issues in San Francisco and the Bay Area. Two Sat. field workshops in San Francisco.
5 units, Win (Gast)

171. Suburbia: New Downtowns of the 21st Century—Evolution of the American suburb, emphasizing the post-WW II suburban centers that emerged as competitors, in terms of size and economy, with the historic urban core. Historical development of the suburbs from 1820 to the present. Current problem (if one exists) and issues of concern. Elements of urban design (circulation, land use, building design, etc.) and their application in the suburban context. Students analyze a case-study non-downtown suburban area near the Stanford campus and recommend improvements.
4 units, Aut (Smiley)

174. Architectural Design Process—Lecture/studio. Introduction to the basics of the building design process through case studies, including studio sessions. Visits and discussions with practicing architects/landscape architects. Student work is prepared as an architectural program statement and as a conceptual massing model, along with simplified site and building-related graphics. Result: demystification of the initial phase of the design process and a better understanding of the professional’s role within it. Architectural office visit. Enrollment limited to 16.
4 units, Spr (Neuman)

175. Contemporary Architecture—Complements Stanford’s annual architectural lecture series. Introduction to contemporary architectural styles, their key attributes, and historical sources. Emphasis is on post-Modernism, deconstructivism, and the continuation of modernist traditions. The work of the architects. Four lectures by guest architects and
private meetings with them. Enrollment limited to 15.

4 units, Spr (Walters)

176. Architecture, Urban Planning and the First Amendment—Seminar on the relationship and balance between the right and value of free expression in architecture and the need for communities to guide their development and visual appeal. Themes and topics: how architecture is similar and different from other arts, the underlying philosophical basis of first amendment traditions, the rise of powerful city planning departments, and the politicization of architectural design.

3 units, Win (Barton)

183. Land Use Control—Survey of current and emerging methods of land use control related to the pattern and scale of development and the protection of land and water resources. Emphasis is on the relationship between the geographical landscape, physical externalities, land use law, and desired land use goals. Topics: the historical roots of modern land use controls, urban reforms of the 19th century, private ownership of land, zoning, innovations in local land use control and state and federal land use control, and regulations and management programs. Current issues of growth management, park and recreation services, transportation, urban housing, wetlands, environmental mediation/conflict management, and special purpose agencies.

4 units, Spr (Cruz)

190. Urban Design and Planning Professions Seminar—Contemporary practice of urban design and planning, community development, and related fields. Bay Area professionals lecture and respond to questions concerning the nature of their day-to-day work, impressions of their field in general, and academic background recommended for their line of work. One session on graduate schools and degrees relevant to these fields.

1 unit (Staff) alternate years, given 1998-99

19A. Community Organizing—Approaches and strategies used by community groups to empower themselves and thereby improve the quality of their lives. Organizers from a variety of groups in the Bay Area and greater Los Angeles serve as guest seminar presenters and discussants. Readings provide an introduction to the theories and philosophies of organizing that inform practitioners today. Pre or corequisite: prior experience working within a community organization.

4 units, Win (Cruz)

19B. Community Service Organizations—The special role that community-based service organizations play in dealing with challenges that local communities face. Representatives of Bay Area advocacy and community-based groups and local governments serve as guest seminar presenters and discussants on issues that face them (leadership development, fund-raising, constituency-building, and organizational management).

1 unit, Spr (Cruz)

192. Internship in Urban Studies—For Urban Studies majors only. Students organize an internship in an office of a government agency or a private firm directly relevant to the Urban Studies major. Program of reading supplements internship. Paper summarizes internship experience and related readings. Prerequisite: 179B.

2-4 units (Ortolano)

193. Special Projects

1-5 units (Staff)

194. Directed Individual Study in Community Organizations—For Urban Studies majors only. Field work with a community organization and preparation of a paper based on the field work. Students are guided by a mentor they select as part of 179B. Prerequisite: 179B.

5 units (Staff)

195. Special Projects in Housing—(Same as Civil Engineering 148.) Directed study examines the assessment of needs for low income housing, how community development influences the supply and demand for low income housing, and alternative ways of meeting low income housing demand.

1-2 units (Paulson) not given 1997-98

197. Directed Reading

1-5 units (Staff)

198. Senior Honors Research in Public Service—Limited to seniors who have registered for and have been approved by their departments for honors thesis, and who have been admitted to the year-round Public Service Scholars Program sponsored by the Haas Center for Public Service. If research is to be conducted as a form of public and community service, what standards for rigor and excellence would apply in addition to those expected by the academy? How can communities benefit from research? Seminar introduces the theory and practice of research as a form of public service, and provides a forum for discussions and presentations of senior honors theses. Readings in research theory and methods, methods of participatory action research; quarterly presentations on research as service; workshops on each individual participant's thesis-work-in-progress; public presentation on completed research; and evaluation (by a community-based reader) of the thesis as a form of public/community service.

1-3 units, Aut, Win, Spr (Cruz)

199A. Honors Thesis—Candidates for honors in urban studies conduct a literature review and prepare a detailed proposal and table of contents outlining the honors thesis.

2-5 units (Staff)
199B. Honors Thesis—Candidates for honors submit a complete first draft of the senior honors thesis at least one quarter prior to graduation. Prerequisite: 199A.
1-5 units (Staff)

199C. Honors Thesis—Candidates for honors revise the draft completed in 199B and submit two final bound copies of the honors thesis two weeks before the end of class in their last quarter at Stanford, one to the student's adviser and a second to the program director.
1-5 units (Staff)

AFFILIATED DEPARTMENT OFFERINGS

See individual department offerings for course descriptions and General Education Requirements (GER) information.

AMERICAN STUDIES

120. The Process and Practice of Community Service
4 units, Win (Stanton)

ANTHROPOLOGY

145A. Person, Gender, and Family in Welfare Policy
5 units (Delaney) not given 1997-98

159A. The Multicultural City in Europe
5 units, Spr (Delaney)

ART

173C. Digital Art in Public Spaces
4 units, Win (Lam-Niemeyer)

280. Seminar: Utopia and Reality in Modern Urban Planning—Primarily for Urban Studies majors, but others may be admitted. Utopian urbanist thinkers (Ebenezer Howard, Le Corbusier, Frank Lloyd Wright, etc.) who established the conceptual groundwork of contemporary urban planning practice. Student participation and research-oriented term paper required. (WIM)
4 units, Win, Spr (Stout, Turner)

CIVIL ENGINEERING

122A. Computer Integrated Architecture/Engineering/Construction (A/E/C)
2 units, Win (Fruchter)

122B. Computer Integrated Architecture/Engineering/Construction (A/E/C)
2 units, Spr (Fruchter)

171. Environmental Planning Methods
3 units, Win (Ortolano)

174. Ethical Issues in Civil Engineering
3-4 units, Spr (McGinn) not given 1998-99

ECONOMICS

148. Urban Economics
5 units, not given 1997-98

EDUCATION

100X. The State of Public Education in Urban Communities
3 units, Win (Takemoto)

105. American Education and Public Policy
4 units, Aut (Kirst, Tyack)

179X. Urban Youth and their Institutions: Research and Practice
3-5 units, not given 1997-98

ENGINEERING-ECONOMIC SYSTEMS AND OPERATIONS RESEARCH

296. Transportation Systems and Urban Development
3 units, Win (Chiu)

GEOLOGICAL AND ENVIRONMENTAL SCIENCES

130. Environmental Earth Sciences I
5-6 units, Aut (Loague, Mader)

HISTORY

67S. Sources and Methods Seminar: Social Change in Industrializing America—A case study of Chicago.
5 units, Aut (Sawslak)

152. American Spaces: An Introduction to Material Culture and the Built Environment
5 units (Corn) not given 1997-98

164. Introduction to Race and Ethnicity in the American Experience
5 units, Spr (Camarillo, Fredrickson)

240. Undergraduate Colloquium: Shakespeare’s London—The Social and Cultural Consequences of Growth
5 units (Seaver) not given 1997-98

251A-B. Undergraduate Colloquium: Poverty and Homelessness in America
5 units (Camarillo) not given 1998-99

269. Undergraduate Colloquium: The African American Community Organizing Tradition
5 units, Aut (Carson)

LINGUISTICS

159. Language and Youth Culture
5 units (Heath) not given 1997-98

POLITICAL SCIENCE

104. Seminar: Urban Policy
5 units, Win (Fraga)

186. Urban Politics
5 units, Win (Fraga)

192F. Seminar: Politics of Race and Ethnicity in the United States
5 units (Fraga) not given 1997-98

291F. Seminar: Urban Politics and Policy
5 units (Fraga) not given 1997-98
PUBLIC POLICY
179A. Preparation for Internship Learning
2 units, Win (Luce, Schmidt-Posner)
179B. Preparation for Internship Learning
1 unit, Spr (Luce)
182. Policy Making and Problem-Solving at the
Local and Regional Level
4 units, Spr (Stanton)

SOCIOLOGY
118. Social Movement and Collective Action
5 units, Win (Olzak)
140. Introduction to Social Stratification
5 units, Win (Titma)
149/249. The Urban Underclass
5 units, Spr (Olzak)
166. Organizations and Public Policy
3 units, Win (Scott)

SPECIAL
PROGRAMS AND
CENTERS

CHICANO RESEARCH,
STANFORD CENTER FOR

Director: to be announced
Associate Director: Charlene Aguilar

The Stanford Center for Chicano Research (SCCR) is a research unit at the University and a
member of the Inter-University Program (IUP) supported by the Ford Foundation. The IUP includes
eight national research centers.

The purpose of the center is to examine information and provide perspectives on a variety of
critical issues to enhance dialogue between the research community and the public.

SCCR Faculty Fellows from disciplines such as anthropology, business, education, engineering,
history, literature, medicine, and political science collaborate on interdisciplinary research projects. Associate Fellows linked to other academic or community institutions in the United
States, Mexico, and Puerto Rico are affiliated with the center and contribute additional expertise and
perspective to projects. The research examines a

variety of projects issues such as child development, poverty, health, cultural identity, and voting
rights. The common thread that draws researchers to the center is a focus on issues and
policy that affect Chicanos and other Latinos in American society.

STANFORD INTRODUCTORY SEMINARS

Participating Faculty: Over 180 faculty from almost 50 departments take part in the Introductory Seminars Program. See the faculty listings internal to each department's listing in this bulletin for pertinent information.

The Stanford Introductory Seminars Program provides opportunities for first- and second-year
students to work closely with faculty as they explore a potential major. These courses aim to intensify the intellectual experience of the freshman and sophomore years by allowing students to work with faculty members in a small-group setting; to introduce students to the variety and richness of the academic topics, methods, and issues which lie at the core of particular disciplines; and to foster a spirit of mentorship between faculty and students. The courses are given departmental credit and most count towards an eventual major in the field.

There are three types of classes offered in the program. Freshman preference seminars are for 3-4 units to a maximum of 16 students, and generally meet twice weekly. Although preference for enrollment is given to freshman, sophomores may participate in a space available basis with the consent of the instructor. Sophomore preference seminars and dialogues, similarly, give preference to sophomores, but freshman may participate on a space-available basis and with the consent of the instructor. Sophomore preference seminars are given for 3-5 units to a maximum of 10-12 students, while sophomore preference dialogues take the form of a directed reading, and are given for 1-2 units to a maximum of 4-5 students. In addition, some sophomore preference dialogues and seminars offered during Autumn Quarter have a special advising component. Students who enroll in these classes, which are called advising dialogues and advising seminars, have the option of choosing the instructor as their adviser for the remainder of the academic year.

Because space is limited, students may enroll in only one of these courses each quarter. All Stanford Introductory Seminars require a brief application. Check the Time Schedule or with the Introductory Seminars office 124 Sweet Hall, phone (650) 723-4388 for more information. Due
dates for applications for the 1997-98 courses are:
Autumn Quarter—5 p.m., September 21 for freshmen preference courses; 5 p.m., September 23 for sophomore preference courses; Winter Quarter—5 p.m., December 12; Spring Quarter—5 p.m., March 20.

COURSES
F=preference to freshmen; S=preference to sophomores; A=advising component; Dial=dialogue; Sem=seminar.

ANESTHESIA
75Q. Literature and Medical Interventions—
(S,Dial)
1 unit, Aut (Shafer)

ART
231N. Hollywood and New York, the 1940's—
(F,Sem)
4 units, Spr (Nemerov)
234Q. Dialogue on the History of Photography—
(S,Dial)
2 units, Spr (Leivick)
278N. The Stanford Campus, Architectural History in Microcosm—(F,Sem)
4 units, Aut (Turner)

ASIAN LANGUAGES
71N. Language and Gender in Japan—Myths and Reality—(F,Sem)
3 units, Win (Matsumoto)
75Q. The Chinese Cultural Revolution and its Aftermath—(S,Dial)
1 unit, Win (Wang)

BIOLOGICAL SCIENCES
11N. Biotechnology—(F,Sem)
3 units, Aut (Walbot)
12N. The Origin of Species—(F,Sem)
3 units, Spr (Ackerly)
13N. Environmental Problems and Solutions—
(F,Sem)
3 units, Spr (Ehrlich)
14N. Plants and Civilization—(F,Sem)
3 units, Spr (Mooney)
15N. Environmental Literacy—(F,Sem)
3 units, Win (Schneider)
16N. Island Ecology—(F,Sem)
3 units, Win (Vitousek)
17N. Biotechnology and Society—(F,Sem)
3 units, Spr (Hoffman)
18N. Plant Genetic Engineering—(F,Sem)
3 units, Win (C. and S. Somerville)
19N. Sex and Gender—An Evolutionary Perspective—(F,Sem)
3 units, Win (Roughgarden)
20N. Pattern Formation in Biology—(F,Sem)
3 units, Spr (Green)
21N. Readings in Molecular Biology and Genetics—(F,Sem)
3 units, Aut (Baker)
22N. Infection and Immunity—(F,Sem)
3 units, Spr (Jones)
23N. Experimental Strategy in Microbiology—
(F,Sem)
3 units, Aut (Long)
37Q. Evolution in Action (S,Sem)
3 units, Spr (Gordon)

CHEMISTRY
21N. On Understanding Science—The Tactics and Strategies of Science—(F,Sem)
2 units, Spr (Ross)
22N. The Frontiers of Science—(F,Sem)
2 units, Win (Collman)
25Q. Science-in-Fiction is Not Science Fiction—
(S,Dial)
2 units, Win (Djerassi)

CIVIL ENGINEERING
60Q. Physical Oceanography of California—
(S,Sem)
5 units, Spr (Monismith)

CLASSICS
14N. History of Liberal Education from Greece to Renaissance—(F,Sem)
3 units, Win (Bloomer)
15N. Ecology in Philosophy and Literature—
(F,Sem)
3 units, Win (Nightingale)
19N. Gospel of John—Its Early History as a Controversial Text—(F,Sem)
3 units, Spr (Gregg)

COMMUNICATION
149Q. Interethnic Communication—(S,Dial)
1 unit, Win (Leets)

COMPARATIVE LITERATURE
30N. Opera and Literature—(F,Sem)
3 units, Spr (Lindengerber)
40N. Fascism and Culture—(F,Sem)
3 units, Aut (Schnapp)
50N. Modern Stars and Medieval Saints—
(F,Sem)
3 units, Win (Gumbrecht)
60N. Poetry and Literacy—(F,Sem)  
3 units, Aut (Saussy)

70N. The Bible and World Culture—(F,Sem)  
3 units, Win (Parker)

115Q. Thinking the Present—20th-Century European Philosophy—(S,Dial)  
2 units, Win (Gumbrecht)

204Q. Ethnicity and Literature—(S,ASem)  
3-5 units, Aut (Palumbo-Liu)

COMPARATIVE MEDICINE

81Q. Mammals—Up Close and Personal—(S,Sem)  
3 units, Spr (Cork)

82Q. Animal Models in Biomedical Research—(S,Dial)  
1 unit, Spr (Tolwani)

83Q. The Horse—(S,Sem)  
5 units, Win (Green)

COMPUTER SCIENCE

99A. The Downside of Computing Systems—(F,Sem)  
3 units, Aut (Baker)

99D. The Science of Art—(F,Sem)  
3 units, Win (Levoy)

99F. Paradox—Bug or Feature?—(F,Sem)  
3 units, Aut (Pratt)

99H. Programming and Problem Solving Seminar—(F,Sem)  
3 units, Spr (Ullman)

99I. Traveling the Information Highways—(F,Sem)  
3 units, Win (Wiederhold)

DERMATOLOGY

100Q. Bioscience and Biotechnology—(S,Sem)  
3 units, Aut (Hoeffler)

DRAMA

11N. Shakespeare’s King Lear at the Beginning of the 17th Century and the End of the 20th—(F,Sem)  
4 units, Aut (Lyons)

12N. Antigone: From Ancient Democracy to Contemporary Dissent—(F,Sem)  
4 units, Aut (Rehm)

13N. Technology and Popular Culture—(F,Sem)  
4 units, Spr (Rayner)

14N. Contemporary German Drama from Brecht to Heiner Mueller—(F,Sem)  
4 units, Win (Weber)

15N. Visual Aesthetics in the Contemporary Theater—(F,Sem)  
4 units, Win (Eddelman)

ECONOMICS

99. State, Market, and Development—(S,Sem)  
5 units, Win (Meier)

ENGINEERING

63Q. Engineering Applications in Medicine—(S,Sem)  
3 units, Aut (Brandeau, Owens)

ELECTRICAL ENGINEERING

93Q. Energy Processes—(S,Sem)  
3 units, Win (da Rosa)

ELECTRICAL ENGINEERING/GEOPHYSICS

60Q. Viewing Hazards on Earth from Space—(S,Sem)  
3 units, Win (Zebker)

ENGLISH

70N. Modern Short Fiction—Close Reading of a Text—(F,Sem)  
3 units, Aut (L’Heureux)

71N. Metamorphoses—(F,Sem)  
3 units, Win (Middlebrook)

72N. Native Studies—(F,Sem)  
3 units, Win (Warrior)

73N. Writers at Work—(F,Sem)  
3 units, Spr (Porter)

74N. Chicano Culture—(F,Sem)  
3 units, Win (Romero)

80Q. Kipling—Propagandist and Critic of Empire—(S,Sem)  
3 units, Spr (Kaul)

81Q. Multimedia Metamorphoses—(S,Sem)  
3 units, Win (Middlebrook)

82Q. Dickens and Hardy—(S,Sem)  
3-5 units, Aut (Marsh)

83Q. Satire (S,Sem)  
3 units, Win (Carnochan)

84Q. Native American Studies—(S,Sem)  
3 units, Win (Warrior)
85Q. Shakespeare's Plays (S,A,Sem)  
5 units, Aut (Rebholz)

FRENCH AND ITALIAN

FRENCH
47N. Camus—(F,Sem)  
3 units, Spr (Apostolidis)
189Q. Romance: Texts and Movies—(S,Sem)  
4 units, Win (Cazelles)
190Q. Paris in History, Literature, and Films—(S,Sem)  
4 units, Spr (Bertrand)

GEOLOGICAL AND ENVIRONMENTAL SCIENCES

50Q. The Coastal Zone Environment—(S,Sem)  
3 units, Aut (Ingle)
52Q. Geologic Development of California—(S,Sem)  
4 units, Spr (Ernst)
53Q. Environmental Problems—(S,Sem)  
3 units, Win (Loague)
54Q. California Landforms and Plate Tectonics—(S,A,Sem)  
3 units, Aut (Miller)

GEOPHYSICS

5Q. Earthquakes of the Americas—(S,Dial)  
1 unit, Aut (Kovach)
20Q. Quantification of Earthquakes—(S,Sem)  
4 units, Win (Beroza)
100. Earthquake Archaeology: Finding more Dead Sea Scrolls—(S,Dial)  
2 units, Spr (Nur)

GERMAN STUDIES

1N. German Studies—(F,Sem)  
5 units, Aut (Berman, Bernhardt)
78Q. The Germans: Who Are They?—(S,Dial)  
2 units, Spr (Petig)
120N. Nationality and the Discourse of Reason—(F,Sem)  
3 units, Aut (Strum)
123N. The Brothers Grimm and their Fairy Tales—(F,Sem)  
4 units, Spr (Robinson)
125Q. The World of Epic—(S,Dial)  
2 units, Spr (Andersson)

HEALTH RESEARCH AND POLICY

89Q. Cross-Cultural Purposes in Medicine—(S,Sem)  
3 units, Win (Corso)

HISTORY

3 units, Win (Findlen)
16N. Science on Trial—The Crimes of Galileo—(F,Sem)  
5 units, Spr (Findlen)
22N. Ethnic Cleansing in 20th-Century Europe—(F,Sem)  
5 units, Win (Naimark)
27N. The First World War in Experience and Memory—(F,Sem)  
5 units, Win (Sheehan)
34Q. Virtuality—(S,Sem)  
5 units, Win (Lenoir)
35Q. 20th-Century History as Lived Experience—(S,Dial)  
2 units, Win (Roberts)
48Q. South Africa—Contested Transitions—(S,Sem)  
3 units, Win (Samoff)
51N. Abraham Lincoln—Myth and Reality—(F,Sem)  
5 units, Spr (Frederickson)
53N. Reflections on the American Condition—American History through Literature—(F,Sem)  
4 units, Aut (Kennedy)
60Q. Urban Inequality in America—Historical Approaches—(S,Dial)  
2 units, Spr (Sawislak)
85Q. Jews and Muslims—(S,Sem)  
5 units, Spr (Rodrique)
90Q. Buddhist Political and Social Theory—(S,Sem)  
5 units, Spr (Mancall)

HUMAN BIOLOGY

90Q. Contemporary Issues in Human Experimentation—(S,A,Sem)  
3 units, Aut (Constantinou)
96Q. Multidisciplinary Perspectives on Guilt—(S,Sem)  
4 units, Win (Katchadourian)
97Q. Critical Insights in Sports Medicine—(S,Sem)  
3 units, Win (Matheson)

LATIN AMERICAN STUDIES

87Q. Urbanization, Poverty, and Children in Latin America—(S,Sem)  
5 units, Spr (Morrison)
LINGUISTICS

35Q. Computers and Human Language—(S,A,Sem)
4 units, Aut (Hubbard, Kay)

49Q. Everyday Life in Africa—(S,Sem)
4 units, Spr (Jackson, Leben)

51N. Diverse Languages, Diverse Speakers—(F,Sem)
3 units, Spr (Sells)

52N. Language and Medicine—(F,Sem)
3 units, Win (Traugott)

54Q. Language, Mind, and Computation—(S,Sem)
3 units, Spr (Peters)

LITERATURES, CULTURES, AND LANGUAGES, DIVISION OF

172Q. Literature and Culture of Modern Greece—(S,A,Sem)
3-5 units, Aut (Prionas)

MATERIALS SCIENCE AND ENGINEERING

159Q. Research in Japanese Companies—(S,Sem)
3 units, Spr (Sinclair)

179Q. Materials in Sports—(S,Sem)
3 units, Spr (Clemens)

MATHEMATICS

80Q. Capillary Surfaces—(S,Sem)
3 units, Win (Finn)

83Q. Introduction to Numerical Analysis and Scientific Computing—(S,Dial)
1 unit, Aut (Zhao)

84Q. Bioinformatics—(S,Sem)
3 units, Aut (Brendel, Karlin)

85Q. Introduction to Mathematical Modeling—(S,Dial)
2 units, Spr (Bronski)

MECHANICAL ENGINEERING

71Q. Combustion—Friend or Foe?—(S,Sem)
3 units, Win (Bowman)

133. Experimental Fluid Mechanics—(S,Sem)
3 units, Win (Eaton)

MICROBIOLOGY AND IMMUNOLOGY

25N. Modern Plagues—(F,Sem)
2 units, Aut, Win, Spr (Boothroyd, Haldar, Kirkegaard)

MUSIC

14N. Women Making Music—(F,Sem)
3 units, Aut (Hadlock)

14Q. Topics in Interactive Computer-Music Performance—(S,Sem)
4 units, Win (Chafe)

15N. The Role of Technology in the Arts—(F,Sem)
3 units, Spr (Berger)

15Q. Opera on Film—(S,Sem)
3 units, Spr (Hadlock)

16N. Richard Wagner and the Ring of the Nibelung—(F,Sem)
3 unit, Spr (Grey)

3 units, Aut (Sano)

17Q. Kurt Weill and the Musical Theater—(S,Dial)
2 units, Spr (Hinton)

PHILOSOPHY

12N. Happiness, Death, and the Meaning of Life—(F,Sem)
3 units, Win (Bobonich)

14N. Ethical Status of Non-Animals—(F,Sem)
3 units, Spr (Ivanhoe)

75Q. Philosophical Views of Nature—(S,Sem)
3 units, Spr (Ivanhoe)

84Q. Rationality and Cognitive Theory—(S,Sem)
3 units, Spr (Cox)

PHYSICS

18N. Revolutions in Concepts of the Cosmos—(F,Sem)
4 units, Spr (Walker)

41N. Mechanics—(F,Dial)
1 unit, Aut (Burchat)

43N. Electricity—(F,Dial)
1 unit, Win (Willick)

80Q. Physics of Photography—(S,Dial)
1 unit, Spr (Osheroff)

81Q. Quantitative Observations in Astrophysics—(S,Dial)
1 unit, Win (Romani)

82Q. Understanding the Universe—(S,Dial)
1 unit, Aut (Wagoner)
83Q. The Physics of Terrorist Bomb Detection—(S,Sem)
   3 units, Aut (Hanna)
84Q. On Growth and Form—(S,Dial)
   1 unit, Spr (Kapitulnik)

POLITICAL SCIENCE
99F. The Evolution of Voting Rights in the U.S.—(S,Sem)
   5 units, Spr (Fraga)
99M. Politics of Bureaucracy—(S,Sem)
   5 units, Aut (Moe)
99P. Institutions and Development—(S,Sem)
   5 units, Spr (Packenham)
99T. Punishment—(S,Sem)
   5 units, Spr (Tunick)

PSYCHOLOGY
4N. Affect and Cognition—(F,Sem)
   3 units, Win (Zajonc)
7N. Consciousness—(F,Sem)
   3 units, Spr (Heeger, Wandell)
12Q. Emotion—(S,Dial)
   2 units, Aut (Gross)
13Q. The Two Sexes—(S,Dial)
   2 units, Aut (Maccoby)
14Q. Psychological Studies of the Life Course—(S,Dial)
   2 units, Win (Hastorf)
19Q. Studies of Animal Behavior—(S,Sem)
   3 units, Aut (R. Fernald)

RELIGIOUS STUDIES
4N. The Evolution of Early Christian Doctrine—God as Trinity and Christ as Divine and Human—(F,Sem)
   3-4 units, Aut (Gerggg)
43Q. Finding your Voice—Rites of Passage and Identity in 20th-Century Fiction—(S,Sem)
   3 units, Aut (Bach)

SCIENCE, TECHNOLOGY, AND SOCIETY
114Q. Environmental Ethics—(S,Sem)
   3-4 units, Aut (McGinn)

SLAVIC LANGUAGES AND LITERATURES
   3 units, Win (Moeller-Sally)
12N. Studies in Russian Civilization—Prince Igor and Boris Godunov—(F,Sem)
   3 units, Win (Fleishman)

SOCIOLOGY
15N. The Transformation of Socialist Societies—(F,Sem)
   5 units, Aut (Tuma)
20Q. Teams and Teamwork—(S,Sem)
   3-5 units, Win (Cohen)
62Q. Transformation of Health Care Systems—(S,Sem)
   3-5 units, Aut (Scott)
65N. Living with Bureaucracy—How Organizations Work and Why They Fail—(F,Sem)
   3-5 units, Win (Freeland)

SPANISH AND PORTUGUESE
110N. Arts and Archives—Research in the Stanford Chicana/o Collections—(F,Sem)
   3 units, Spr (Yarbro-Bejarano)

STATISTICS
40N. Chance—(F,Sem)
   3 units, Win (Switzer)
50N. Mathematics in Sports—(F,Sem)
   3 units, Spr (Cover)
105Q. Statistical Design of Experiments in Extrasensory Perception—(S,Dial)
   3 units, Spr (Switzer)

UNDERGRADUATE RESEARCH OPPORTUNITIES (URO)

Director: Laura S. Selznick

The Undergraduate Research Opportunities (URO) program seeks to combine two of Stanford's greatest strengths: the eminence of its research faculty and excellence in undergraduate education. URO encourages students to work independently on projects with faculty and thus to participate directly in Stanford's research community.
UNDERGRADUATE RESEARCH OPPORTUNITIES

The collaboration takes place in two principal formats. Faculty members may list ongoing research projects in which undergraduates can become involved. Or, undergraduates may design their own individual projects and pursue them under the sponsorship of an individual faculty member. The URO staff directs students to departments with established research programs, advertises opportunities submitted by individual faculty, and helps to develop resources.

Faculty who have participated in this program have found enthusiastic and energetic assistants, made better progress in research, and freed up time for more specialized work. Students have appreciated the direct contact with faculty, immersion in a topic of mutual interest, and the unique learning opportunity that research provides.

LISTING RESEARCH

Faculty members with ongoing research programs are encouraged to identify a piece of their project appropriate to undergraduate competencies and to list it through URO. (Purely menial or mechanical projects are not appropriate.) The researcher should clearly state the nature of the position, requisite background and qualification, and the expected time commitment. Determination of credit appropriate to each project is left to the researcher and the student. The formula generally used is three hours of intellectual work per week per academic unit. (On average, students have received 3 units of credit per quarter in exchange for a commitment of ten hours per week.)

RESOURCE FILES

Students can obtain free access to two data bases designed to facilitate undergraduate research projects. The Odyssey and Faculty Interests files are available through Stanford's Portfolio home page on the World Wide Web. Odyssey lists openings for student research assistance on faculty research projects (as well as public service opportunities from the Haas Center for Public Service and internships from the Career Planning and Placement Center). The Faculty Interests file contains information about the research interests of individual Stanford faculty across the University. Students can use faculty interest information in identifying potential sponsors for projects of their own design or in seeking advice about a particular discipline.

FUNDING AVAILABLE

The Fund for Undergraduate Research is administered by URO and is available exclusively to Stanford undergraduates. Application forms for all grants must be obtained at 122 Sweet Hall. Grant advice is available there and at the URO Web page (http://www-uro.stanford.edu). The deadlines for major grants (up to $2,500) for 1997-98 are Friday, April 3 for projects in social sciences, natural sciences, and engineering and Friday, April 17 for projects in humanities and creative arts. Students with interdisciplinary projects are encouraged to apply by the earlier deadline.

Small grants ($500 maximum per project) are awarded each quarter. The deadlines are October 24, February 6, and April 17.

Major grants differ from small grants in the scope of the project proposed rather than the level of reimbursement requested. Small and major grants are restricted to supplies and expenses associated with research. Major grants are awarded once a year, during Spring Quarter, to as many as 100 students whose projects reflect the highest level of creativity and independence and the greatest promise for exciting results. Students on financial aid may sometimes receive funds to replace summer earnings expectations. Summer earnings can occasionally be replaced for small grant winners with a high level of financial need.

The Chappell-Lougee Scholars program is a special opportunity for sophomores in the humanities and social sciences to be involved in research under faculty mentorship. Faculty may nominate students or students may nominate themselves. Financial need is considered, as well as the academic goals of the proposed project. Applications and nominations are due to the URO office by Friday, November 28, 1997. The URO office has information on applications and criteria.

The Future Faculty Incentives Program encourages URO grant recipients from all categories to consider a career in college or university teaching. The award provides undergraduate loan repayment up to $10,000 for graduate work toward a Ph.D. Preference is given to members of under-represented minority groups in selected fields. Financial need and evidence of disadvantaged background are also considered in the selection process. The application deadline is May 15 of the year in which the student plans to matriculate in a graduate program.

Stanford Fund Research Assistantships and Research Awards enable undergraduates in the humanities and social sciences with financial need to gain research experience in lieu of a campus job. Assistantships are for students who have not yet declared a major, but wish to explore a particular field under faculty supervision. Research Awards are for declared students with subject-matter expertise who wish to pursue that interest further. Recipients may have from 10 to 15 weeks of term-time earnings replaced. High financial need is a criterion for acceptance. A maximum of 25 weeks of work in undergraduate employment may be replaced.

Mellon Minority Undergraduate Fellowships benefit students from under-represented minority groups; students in the humanities are eligible. The fellowships encourage pursuit of honors
at Stanford and enrollment in a Ph.D. program after graduation from Stanford. Benefits include earnings replacement, scholarship expenses, and undergraduate loan repayment totaling a maximum of $20,000. The deadline is Friday, June 12, 1998.

STANFORD IN WASHINGTON

Director: Adrienne Jamieson

Stanford in Washington provides highly-qualified undergraduates with an opportunity to work and study in the nation's capital. In addition to providing students with an understanding of public policymaking, the program offers an opportunity to take advantage of the city's unique cultural resources.

Central in the student's educational experience is an internship. Students serve as interns at such institutions and agencies as the Senate, the House of Representatives, the Office of Management and Budget, the Securities and Exchange Commission, the Smithsonian Institution, the National Gallery, and the departments of Commerce, Education, Health and Human Services, Justice, and State.

In addition to the internship, students must also complete an academic course of study consisting of small tutorials taught by policy experts (5 units), and weekly policy seminars taught by Stanford faculty members (5 units). Frequently, speakers from the Washington policy community join students and faculty for discussions. Students usually write a major paper related to their internship for 3-5 units of credit. Course and seminar topics vary according to student and faculty interest.

Stanford in Washington offers "stretch quarters" in the Autumn and Spring (mid-September to mid-December, and late March to the end of June) and a regular quarter in Winter, which focuses on environmental studies. The program is designed for students in their junior year or the first quarter of their senior year. Applications must be completed two quarters in advance. For Autumn Quarter, apply early Winter Quarter of the previous year. For Winter Quarter, apply early Spring Quarter of previous year. For Spring Quarter, apply early Autumn Quarter. Students interested in the program may obtain a brochure at the Haas Center for Public Service or call for information, (650) 723-0992.

Dean: Paul A. Brest
Associate Deans: Susan S. Bell, Frank Brucato, Sally Kim

Academic Curriculum Officers: Marc A. Franklin, Robert Weisberg


Associate Professors: George Fisher, Linda Mabry (on leave)

Assistant Professors: Marcus Cole, Richard T. Ford

Professor (Teaching): William C. Lazier

Courtesy Professor: Abraham Sofaer


Consulting Professors: George R. Crawford, Carey Heckman, Allan Kleidon, Stanley Lubman, David Mills, Karen Musalo, Thomas Nolan, Maude Pervere

Visiting Professors: Jo J. Carrillo, Thomas Ehrlich, Richard G. Goldstone, Daniel M. Klerman, Peter Maier, Mathew L. Spitzer

The School of Law was established as a department of the University in 1893. Its purpose is to provide a thorough legal education for students who are fitted by their maturity and their previous academic training to pursue professional study under university methods of instruction. The curriculum leading to the first professional degree in law (J.D.) constitutes an adequate preparation for the practice of law in any English-speaking jurisdiction. Graduate work leading to the degrees of Master of the Science of Law and Doctor of the Science of Law is also offered. (For the full curriculum, see the Stanford University bulletin School of Law.) The school is on a two-term academic calendar. Autumn term classes begin on September 4, 1997. Spring term classes begin on January 20, 1998, and the term ends on May 27, 1998.

COURSES

GRADUATE

The following courses are open to qualified graduate students in other departments of the University upon consent of the instructor:

229. Law and Social Science—(Same as Psychology 290.) Viewing social science as an analytic tool, examines its role in the American legal process. The relevance of social science theory and empirical findings for such issues as copyright, human responsibility, desegregation, deterrence, fair employment, and jury dynamics. The nature of expertise and its relevance to these matters. Emphasis is on the scientific method and its relevance to legal analysis.

3 term units (Rosenhan) not given 1997-98

236. Art and the Law—The range of problems that arise at the intersection of law and the visual arts (painting, sculpture, and graphic art): the protection of works of art in time of war, occupation, and civil strife; international traffic in stolen and smuggled cultural treasures; censorship, criticism, selection, and artistic freedom; copyright, moral right, and the proceeds right; art forgery, fakes, and consumer protection in the visual arts; legal relations between artists, dealers, museums, collectors, and auction houses; tax and estate problems of artists and collectors; legal services for artists; artnapping and insurance; legal problems of art museums, etc.

3 term units, Spr semester (Merryman)

307. Gender, Law, and Public Policy—Open to second- and third-year law students and other qual-
ified students with consent of instructor. Topics: equal protection standards, employment, reproductive rights, sexual harassment, rape, domestic violence, pornography, sexual orientation, feminist legal theory and the family.

3 term units (Rhode)

313. Health Law and Policy—Open to all law or medical students and to graduate and undergraduate students, by consent of the instructor. Introductory survey of the American health care system and its legal and policy problems. Topics: the special characteristics of medical care compared to other goods and services, difficulties of assuring quality care, the complex patchwork of the financing system, and the ethical problems the system raises.

3 term units, Aut semester (Greely)


2 term units (Greely) not given 1997-98

376. Psychology and Law Proseminar—(Same as Psychology 300.) Legal, psychological, and popular views of morality, responsibility, equity, intention, insanity, evidence, crime, and punishment; the police; psychological processes in jury deliberation; homicide and aggression; treatment of accused persons.

3 term units (Rosenhan) not given 1997-98

440. Biotechnology: Legal and Policy Issues—Open to graduate and professional students; qualified undergraduates by consent of the instructors. Interdisciplinary exploration of legal and policy issues raised by the biotechnology industry. Patenting, corporate organization and financing, conflicts of interest, regulatory approvals, health care financing issues, tort liability, and the prospects for and implications of the biotechnology revolution.

2 term units (Barton, Botstein, Greely) not given 1997-98

568. Religious Sensibility and the Establishment Clause—(Same as Psychology 289.) The historical background to the Establishment clause, psychological and sociological literature about religiosity. Emphasis is on the nature of absolute beliefs, the relations between beliefs and behavior, and the particular problems ardent beliefs pose in a democracy. How is the line properly drawn between the requirements of democracy and imperatives of belief?

1-3 term units (Rosenhan) not given 1997-98

611. Interdisciplinary Seminar on Conflict Resolution—(Same as Economics 386, Engineering Economic Systems and Operations Research 489, Psychology 283.) Addresses problems of conflict resolution and negotiation from an interdisciplinary perspective. Presentations by faculty and scholars from other universities.

1 term unit, Win (Alexander, Arrow, Ross, Wilson)

NONPROFESSIONAL

The following course is open to juniors, seniors, and graduate students in other departments, and may be counted toward the A.B. degree but not toward professional degrees in law.

106. Introduction to American Law—(Same as American Studies 179, Political Science 182F.) American law for undergraduates. The structure of the American legal system including the courts, American legal culture, the legal profession and its social role, the scope and reach of the legal system, the background and impact of legal regulation, the relationship between the American legal system and American society in general.

5 unit, Aut (Friedman)
The School of Medicine offers courses of study leading to the M.S., Ph.D., and M.D. degrees.

UNDERGRADUATE PROGRAMS

At the undergraduate level, a number of the school’s courses are open to any registered Stanford student who has fulfilled the prerequisites, subject to the usual limits of course enrollment and faculty approval. Details on admission into undergraduate programs are described in the “Undergraduate Degrees” section of this bulletin.

GRADUATE PROGRAMS

M.S. AND Ph.D. PROGRAMS

Departments offer programs leading to the Ph.D. degree. Applications and information for all graduate programs may be obtained from Graduate Admissions, Registrar’s Office, Stanford University, Stanford, California 94305-3005.

M.D. PROGRAMS

The School of Medicine provides an educational environment that encourages intellectual diversity and offers stimulation and opportunity for self-motivated students who are interested in developing a scholarly, investigative approach to problems in medicine. Accordingly, Stanford has designed its medical curriculum with a two-fold purpose: to develop in all students the capacity for leadership in the clinical practice of scientific medicine and to provide them opportunities to prepare themselves for careers in research and teaching in the various branches of basic, clinical, and social medicine. The flexible curriculum allows for individual needs in scheduling course work. Students develop study plans that take into consideration their academic background, particular strengths, and career objectives.

All medical students must complete a formal curriculum in the basic medical sciences and have formal clinical experience in medicine, surgery, pediatrics, gynecology-obstetrics, family medicine, and psychiatry. Following completion of 13 quarters of academic work, additional quarters may be taken at a special student rate. Involvement in research and outside course work may extend the time spent in medical school. Completion of the M.D. degree must be achieved within six years, unless a petition is granted to extend this time frame.

There are a variety of opportunities for in-depth study of subject areas in the basic sciences. Students with strong interests in medical research as a career are urged to investigate opportunities available under the auspices of the Medical Scientist Training Program (MSTP). This program provides a limited number of students the opportunity to pursue an individualized program of research and course work leading to both the M.D. and Ph.D. degrees. The estimated time for completion of the program is seven years. Students interested in participating in the MSTP are asked to provide supplemental information relevant to their research background and are considered for entry into the MSTP at the time of their application to the School of Medicine.

The admissions process recognizes that some minorities and women are under-represented in the medical profession, and especially in academic medicine; the school has a strong commitment to identify, recruit, and educate such students.

Provided an applicant to the school has completed the basic courses in physics, chemistry, and biology, the choice of an undergraduate major may reflect other interests, including the arts and humanities. Course work in mathematics and the behavioral sciences is highly recommended because of its importance in understanding medicine. Extracurricular activities and breadth of interests and experiences play an important role in the selection of students from among those applicants having superior records.

Further details on the M.D. degree, including admission requirements, are in the Stanford University School of Medicine Catalog, available on the World Wide Web at http://www-med.stanford.edu/school/catalog . For application materials write: Committee on Admissions, Stanford University, School of Medicine, 851 Welch Road, Room 154, Palo Alto, CA 94304-1677.

BIOCHEMISTRY

Emeriti: (Professors) Paul Berg, Arthur Kornberg
Chair: James A. Spudich
Associate Professors: Patrick O. Brown, Douglas L. Brutlag, Gilbert Chu, Daniel Herschlag
Mark A. Krasnow, Suzanne R. Pfeffer
Assistant Professor: Pehr A. B. Harbury
Biochemistry is a department within the School of Medicine with offices and labs located in the Beckman Center for Molecular and Genetic Medicine at the Stanford Medical Center. Courses offered by the department may be taken by undergraduate, graduate, and medical school students. A basic series in biochemistry (200, 203) is taught by the entire staff and requires a good background in organic chemistry and cell biology.

Advanced courses are offered in more specialized areas and they emphasize the most recent developments in biochemistry, cell biology, and molecular biology. These courses include the physical and chemical principles of biochemistry, enzyme reaction mechanisms, membrane trafficking and biochemistry, molecular motors and the cytoskeleton, mechanisms and regulation of nucleic acid replication and recombination, the biochemistry of bacterial and animal viruses, the molecular basis of morphogenesis, the molecular and cell biology of yeast, and the structure and function of both eukaryotic and prokaryotic chromosomes.

Opportunities exist for directed reading and research in biochemistry and molecular biology, utilizing a small but excellent departmental library as well as the most advanced research facilities, including those for light and electron microscopy, chromatography and electrophoresis, protein and nucleic acid purification, synthesis and analysis, single molecule analyses using laser light traps, and computer graphic workstation facilities for protein and nucleic acid structural analysis. Ongoing research utilizes a variety of organisms, ranging from bacteria to animal cells.

**GRADUATE PROGRAM**

**DOCTOR OF PHILOSOPHY**

The Department of Biochemistry offers a Ph.D. program which begins in the Autumn Quarter of each year. The program of study is designed to prepare students for productive careers in biochemistry; its emphasis is training in research, and each student works closely with members of the staff. In addition to the requirement for a Ph.D. dissertation based on original research, students are required to complete six advanced courses in biochemistry and related areas, and at least three of these courses must be taken in the Department of Biochemistry. Selection of these courses is tailored to fit the background and interests of each student. A second requirement involves the submission of three research proposals which are presented by the student to a small advisory committee of departmental faculty members, who are also responsible for monitoring the progress of student curricular and research programs. All Ph.D. students are expected to participate actively in the department's seminar program and journal club, and students are encouraged to attend and to present papers at regional and national meetings in cellular biochemistry and molecular biology. Teaching experience is an integral part of the Ph.D. curriculum and is required for the degree.

The Department of Biochemistry offers a M.S. degree only to students already enrolled in the Ph.D. program. Students should contact the Graduate Studies adviser for more details.

General University regulations concerning the M.S. and Ph.D. degrees are summarized in the "Graduate Degrees" section of this bulletin. The department does not offer undergraduate degrees.

The departments of Structural Biology and Biochemistry have a joint training program and prospective students may apply to either department. Admitted students gain research experience through lab rotations in both departments. The eventual choice of a research adviser determines the department from which the Ph.D. degree is earned. Those applying should have at least a baccalaureate degree and should have completed work in cell and developmental biology, basic biochemistry and molecular biology, genetics. Also required are: at least one year of university physics; differential and integral calculus; and analytical, organic, inorganic, and physical chemistry. The department is especially interested in those applicants who have research experience in biology or chemistry. Students must submit an application, including transcripts and letters of recommendation, by December 15.

Beginning September 1, applications are available and can be requested by mail from Graduate Admissions, Registrar's Office, Old Union, Stanford University, Stanford CA 94304-3005, by phone (650) 723-4291, or email at ck.gaa@sythe.stanford.edu. Applicants are notified by April 1 of decisions on their applications. Stanford University requires scores from the Graduate Record Examination (GRE) (verbal, quantitative, and analytical), and in addition applicants must submit scores from the GRE Subject Test in either biochemistry, biology, or chemistry. Applicants should take the October GRE exam.

All applicants are urged to compete for non-Stanford fellowships or scholarships, and U.S. citizens should complete an application for a National Science Foundation and a Howard Hughes Medical Institute Predoctoral Traineeship. Students are provided with financial support to cover normal living expenses; Stanford tuition costs are paid.

All applicants for admission to the department are considered without regard to race, color, creed, religion, sex, age, national origin, or marital status.

Postdoctoral research training is available to graduates who hold a Ph.D. or an M.D. degree. Qualified individuals may write to individual faculty members for further information.
At present, the primary research interests of the department are the structure and function of proteins and nucleic acids, the biochemical and control of development processes, molecular motors and the cytoskeleton, the trafficking of proteins between membrane-bound organelles, and the control and regulation of gene expression.

COURSES


5 units, Win (Pfeffer, Kaiser, Spudich)

203A. Molecular Biology Core Lectures—DNA structure and metabolism, chromosome structure and function, gene expression and its control, regulation of transcription, protein structure and function, RNA processing, and translation. Interspersed with 203B each week. Prerequisite: 200 or equivalent. Corequisite: 203B.

3 units, Spr (Staff)

203B. Molecular Biology Minicourses—In-depth treatment of topics in 203A plus topics with medical relevance. Participation in five two-hour minicourses (1 unit) satisfies medical school graduation requirement. Participation in nine two-hour minicourses (2 units) satisfies graduate student requirement. Interspersed with 203A. Prerequisite: 200, 203, or equivalents, and consent of instructor.

1-3 units, Spr (Staff)

210. Advanced Topics in Membrane Biochemistry—Structure, function, and biosynthesis of cellular membranes and organelles. Based on current literature, with extensive student participation. Prerequisites: 200, 203, or equivalents, or consent of instructor.

4 units (Pfeffer) not given 1997-98

211. Development in Microorganisms—(Same as Development Biology 215.) Cell differentiation and multicellular development in microorganisms. Microbes are attractive subjects for molecular studies of the regulation of development because they can be manipulated easily by genetic and biochemical techniques, handled in large numbers, and because their genomes are relatively small. Topics: temporal and spatial regulation of cell division; sporulation; flagella and pili morphogenesis; positional information; cell-cell communication and multicellular development; signal transduction pathways. Lectures/readings in current literature.

2 units, Aut (Kaiser, Shapiro)

213. Biological signaling during Development—(Same as Development Biology 213.) Biochemical and genetic analysis of the developmental response of cells, or cell clusters, to specific molecular signals. Signals vary from complex proteins to simple molecules (steroid hormones), and the responding cells vary from these in close proximity to signal-generating cells to all cells in the organism. Focus is on the signaling mechanisms and on the evolutionary conservation of these systems. Prerequisites: knowledge of basic biochemistry and genetics.

3 units, Spr (Hogness)

214. Physical and Chemical Principles of Biochemistry—Physical chemistry of proteins, nucleic acids and their complexes, and the chemistry underlying biological reactions; principles of enzymatic catalysis. The physical and chemical concepts that are fundamental to biological processes. Appraisal of experimental and conceptual approaches and analysis of classic and current papers in the literature. Areas: interactions involved in protein and nucleic acid structure and folding; energetic, chemical, and structural principles of enzymatic catalysis and control. Prerequisites: 200, 203 or equivalent, a course in physical chemistry, and a course in organic chemistry.

4 units, Spr (Herschlag)

215. Frontiers in Biological Research—(Same as Developmental Biology 215.) Literature/discussion on how to critically evaluate current biological research. Held in conjunction with a Wednesday seminar series, hosted in alternate weeks by Biochemistry and Developmental Biology. Each week an invited speaker presents his or her work in a particular system. Before the seminar, students and faculty read and critically discuss one or more papers from the primary research literature on a related topic. After the seminar, students meet informally with the speaker to discuss the research and future directions. Emphasis is on how to read papers in the primary research literature, the set of techniques most commonly used to study problems in biology, and a comparison between genetic and biochemical approaches in biological research.

1 unit, Aut, Win (Krasnow, Kingsley, Villeneuve)

217. Advanced Tutorial in Special Topics—Readings and tutorial in membrane biochemistry, enzyme mechanisms, chromosome structure, biochemical genetics, bacterial and animal viruses, and nucleic acid enzymology. Conducted under the guidance of advanced graduate students and postdoctoral fellows.

1-3 units, any quarter (Staff)

218. Computational Molecular Biology—(Same as Medical Information Sciences 231.) For molecular biologists and computer scientists desiring to understand the representation and analysis of biological sequences and structures. New and various existing methods and the strengths and limitations are evaluated. Practical assignments utilizing the tools described. Topics: introduction to the Internet,
accessing molecular databases, pattern search, classification of sequence and structure, alignment of sequences, rapid similarity searching, phylogenies, consensus sequencing, physical mapping of DNA and genomes, representing protein structure, and modeling protein structure by homology. Final project utilizes or analyzes the methods presented. Lecture/lab. Enrollment limited to 40. Prerequisite: introductory molecular biology at the level of Biology 31 or consent of instructor. Recommended: prior exposure to personal computers, electronic mail, and typing skills.

3 units, Aut (Brutlag)

221. The Teaching of Biochemistry—To be taken by all teaching assistants in 200, 203, or 217. Emphasizes practical experience in teaching on a one-to-one basis, and problem set design and analysis. Familiarization with current lecture and text materials is expected, along with evaluations of class papers and examinations. Prerequisite: enrollment in the Biochemistry Ph.D. program or consent of instructor.

3 units, any quarter (Staff)

225. Molecular Motor Proteins and the Cytoskeleton—(Same as Developmental Biology 225.) The molecular basis of energy transduction that leads to movements generated by microfilament-based and microtubule-based motors. In-depth analysis of forms of myosin, dynein, and kinesin and their roles in the cell, as a model for understanding the structural, biochemical, and functional properties of biological machines in general. Topics: structure of the molecular motors and their accessory proteins; regulation of the function of motile assemblies; functions of molecular motors in cells; spatial and temporal controls on the formation of motile assemblies in cells. Experimental approaches: genetic analysis, DNA cloning and expression, reconstitution of functional assemblies from purified proteins, x-ray diffraction, three-dimensional reconstruction of electron microscope images, spectroscopic methods, and high-resolution light microscopy. Focuses on how a complex cellular process is analyzed at the molecular level by a multifaceted approach using biochemical, biophysical, and genetic techniques. Prerequisites: knowledge of basic biochemistry and cell biology.

3 units (Spudich, Fuller) not given 1997-98

237. Introduction to Biotechnology—(Same as Biological Sciences 237, Chemical Engineering 237, Civil Engineering 237, Developmental Biology 237, Structural Biology 237.) Faculty from the Departments of Biochemistry, Biological Sciences, Chemical Engineering, Civil Engineering, Developmental Biology, Structural Biology, and invited industrial speakers review the interrelated elements of modern biotechnology. Topics: protein structure and dynamics, protein engineering, biocatalysis, gene expression, cellular metabolism and metabolic engineering, fermentation technology, and purification of biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences or engineering.

3-5 units (Robertson) given 1998-99

294. DNA Repair, Recombination, and Replication—Enzymes and molecular mechanisms and how some physiological aspects of DNA transactions may be explained at the molecular level. Prerequisites: 200, 203.

2 units (Lehman)

299. Directed Reading—Prerequisite: consent of instructor.

1-18 units, any quarter (Staff)

399. Research and Special Advanced Work—Register by section numbers by arrangement with faculty. Prerequisite: consent of instructor.

1-18 units, any quarter

CENTER FOR BIOMEDICAL ETHICS

Co-Directors: Thomas A. Raffin, Ernlé W. D. Young

Executive Director: Barbara A. Koenig

Steering Committee: Kenneth Arrow (Economics, emeritus), Paul Berg (Molecular and Genetic Medicine), Rachel Cohon (Philosophy), David Cox (Stanford Human Genome Mapping Center), Ronald Davis (Biochemistry), Victor Fuchs (Economics, Health Research and Policy, emeritus), Joan Fujimura (Anthropology), Linda Giudice (In Vitro Fertilization and Reproductive Endocrinology Laboratories), Mary Goldstein (General Internal Medicine, V.A. Palo Alto Medical Care System), Henry Greely (Law), Peter Gregory (Chief Medical Officer, Stanford Health Services), Susan Okin (Ethics in Society Program, Political Science), Debra Satz (Philosophy), Lucille Shapiro (Developmental Biology), David Stevenson (Pediatrics)

The Stanford University Center for Biomedical Ethics is an interdisciplinary center devoted to teaching and research in scientific and biomedical ethics. Its mission is to: apply ethical reasoning to actual moral problems in the practice of medicine and science; contribute to the national and international discussion of biomedical and scientific issues through research, public symposia, and published papers and monographs; convene scholars, professionals, and policy-makers to debate and propose policy solutions regarding biomedical and scientific ethical issues; serve as a scholarly resource for the University, the Medical Center, and the community at large on emerging ethical issues in medicine and science; and build a community of individuals dedicated to formu-
lating fresh responses to contemporary ethical issues.

The Center for Biomedical Ethics recently launched the Program in Genomics, Ethics, and Society, a multidisciplinary program to address the compelling social, ethical, legal, and political implications of advances in human genetics.

**COURSES**

For further information, see the Stanford University School of Medicine Catalog.

**MEDICINE**

**214. Literature and Medicine**—Reading/discussion on the uses of literature as a guide to the humanistic aspects of patient care. Essays, stories, and poems by physicians, patients, and family members on medical training, the patient’s perspective, and medical ethics.

1 unit, Win (Shafer, Koenig)

**250A. Medical Ethics I**—Theories of ethical and moral decision-making. Emphasis is on the dilemmas confronting medical practitioners. Seminar/discussion groups. Objectives: developing and applying a methodology for decision-making; delineating key issues in biomedical ethics (the nature of the relationship between physician and patient, informed consent, determination of "quality of life," and who should participate in the decision-making process); and addressing dilemmas and topics in biomedical ethics.

3 units, Win (Young)

**250B. Medical Ethics II**—Advanced examination of a narrower range of topics at greater depth for those who have acquaintance with biomedical ethics. Objectives: examine the fundamental ethical principles underlying medicine and the life sciences and the relationships between them, correlate these principles with ethical issues in the practice of medicine, and suggest areas where conceptual clarity and methodological finesse is required to meet emerging new challenges in the field.

3 units, Spr (Young)

**255. The Responsible Conduct of Research**—A forum for scientists to familiarize themselves with institutional policies/practices and professional standards that define scientific integrity. Overview of ethics in research, authorship, and human interest at the academic-commercial interface, and small group sessions for more extended discourse between students and faculty. Completion fulfills NIH/ADAMHA requirement for instruction in the ethical conduct of research.

Win (Young)

**256. Seminar: Ethical Discourse through Science-in-Fiction**—Scientists operate within a culture whose rules, mores, and idiosyncrasies are not acquired through intellectual osmosis in a mentor-disciple relationship. A new didactic tool for illuminating that culture is the literary genre of "science-in-fiction," in which all aspects of scientific behavior and of scientific facts are described accurately and plausibly, illustrating ethical dilemmas not raised for reasons of discretion, embarrassment, or fear of retribution. Students, from studied examples, compose a short story of relevant behavioral practices or observed or reported events with ethical connotations used as the plot line, to illustrate the problem to a general public. In-depth discussions of some of the topics raised. Enrollment limited to 8-10 medical or graduate science students.

2 units, Win (Djerassi)

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**CANCER BIOLOGY PROGRAM**

Chair and Program Director: Martin Brown
Committee on Cancer Biology: J. Martin Brown, (Professor of Radiation Oncology), Michelle Calos (Associate Professor of Genetics), Joseph Lipsick (Associate Professor of Pathology), Lucille Shapiro (Professor of Developmental Biology), Branimir Sikic (Professor of Medicine), Michael Simon (Assistant Professor of Biological Sciences)

The Cancer Biology Program is designed to provide a framework for students with an interest in the understanding and control of neoplastic growth and to build a curriculum in varied biomedical areas relevant to that subject. Students in this program are based in departments appropriate to their specialty and are subject to the core requirements specified below. A Ph.D. is offered in Cancer Biology. Basic University requirements for the Ph.D. are described under the "Graduate Degrees" section of this bulletin.

**GRADUATE PROGRAM DOCTOR OF PHILOSOPHY**

A few well-qualified applicants are admitted to the program each year. Applicants should have completed an undergraduate major in the biological sciences; applicants with undergraduate majors in physics, chemistry, or mathematics may be admitted if they complete background training in biology during the first two years of study. During the first year, each student is required to constitute a three-person advisory committee which assists with the development of an appropriate program of courses and provides advice and consultation on thesis-related research. The appointment of this committee is normally carried out in consultation with the student’s research preceptor, who chairs the advising committee.

The requirements for the Ph.D. degree are as follows:
1. Training in biology equivalent to that of an undergraduate biology major at Stanford.
2. Completion of the following courses (or their equivalents, except for the Cancer Biology course):
   a) Biochemistry 200, 201, General Biochemistry and Advanced Molecular Biology
   b) Molecular and Cellular Physiology 221, Cell Biology of Physiological Processes
   c) Health Research and Policy 202, Biostatistics
   d) Cancer Biology 241, 242, 243, Molecular and Cellular Biology of Cancer
3. At least 12 units of additional courses given by four or more different Stanford faculty members. Course work taken is determined in consultation with the student’s Advising Committee.
4. Attendance at the Medical School Bioethics Series.
5. Presentation of research results at the Cancer Biology annual retreat on at least three occasions.
6. Successful completion of a comprehensive qualifying examination in Cancer Biology is required for admission to Ph.D. candidacy. This examination must be completed prior to the end of the second full year of study in the program. The examination is set by the advising committee and consists of two parts. The first is a written proposal modeled on an NIH grant application and describing a current area of research interest with proposed experiments in a field of relevance to cancer biology. The subject of the proposal is chosen by the student in consultation with his/her advising committee. The second is an oral presentation to the Advising Committee of dissertation research or proposed dissertation research. The advising committee is presented with a brief written description of this research prior to the oral examination.
7. The presentation of a Ph.D. dissertation as the result of independent investigation and constituting a contribution to knowledge in the area of cancer biology.
8. The successful passing of the University oral examination which is taken only after the student has substantially completed his or her research. The examination is preceded by a public seminar in which the research is presented by the candidate. The oral examination is conducted by a dissertation reading committee.

COURSES

Course work and lab instruction in the Cancer Biology Program conforms to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

   3 units (Staff)
   alternate years, not given 1998-99
251,252,253. Special Topics in Cancer Biology—Full-quarter courses or half-quarter minicourses given by different lecturers on topics of major importance in cancer research.
   251. 1-3 units, Aut (Staff)
   252. 1-3 units, Win (Staff)
   253. 1-3 units, Spr (Staff)
263: Apoptosis in Normal Development and Cancer—The importance of apoptosis (programmed cell death) in normal development and in formational progression. Apoptotic paradigms in hemopoetic, neurological, and cardiovascular tissues, contrasted with those in malignant transformation and progression. Organized/coordinated by Assistant Professor Giaccia.
   4 units (Staff)
299. Research—Students registered for the Ph.D. must register as soon as they begin dissertation-related research work.

COMPARATIVE MEDICINE

Chair: Linda C. Cork
Professor: Linda C. Cork
Assistant Professors: Sherril Green, Glen Otto, Ravi Tolwani

The Department of Comparative Medicine is a relatively new basic science department and does not offer degrees, but its faculty offer courses and participate in teaching in other departments at the undergraduate and graduate level. Faculty members, most of whom are specialists in some veterinary medical specialty, also accept students to participate in ongoing research projects within the department and assist students with special research projects.

The discipline of Comparative Medicine utilizes the differences and similarities among species to understand basic biologic and disease mechanisms. Comparative Medicine incorporates the use of spontaneous or induced disease models as one of several approaches to research. Faculty members have expertise in infectious diseases, neuropathology, neuroscience, molecular genetics, anesthesiology, rodent biology, and so on.
COURSES

Course work and lab instruction in the Department of Comparative Medicine conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

81Q. Stanford Introductory Seminar: Mammals—Up Close and Personal—Preference to sophomores. Comparative approach to common mammals, laboratory and domestic species. Investigates the unique adaptations of each species in terms of its morphological, anatomical, and behavioral characteristics. How these species interact with humans and the historical relationships between humans and these animal species.

3 units, Spr (Cork)

82Q. Stanford Introductory Dialogue: Animal Models in Biomedical Research—Preference to sophomores. Overview of usefulness of animal models in biomedical research, both naturally occurring animal models that mimic human disease and induced models developed by transgenic techniques, as tools to study mechanisms of disease and develop new therapeutic techniques. Examples of animal models in medical disciplines. The techniques utilized to develop animal models, including transgenic technology.

1 unit, Spr (Tolwani)

83Q. Stanford Introductory Seminar: The Horse—Preference to sophomores. Overview of the most common equine diseases, ranging from colic to lameness. Equine anatomy and physiology relevant to selected topics in equine medicine. Equine infectious diseases, respiratory disorders, care of the newborn foal, a "what's your diagnosis" problem series, and emergency first aid strategies.

5 units, Win (Green)

205. Biology of Laboratory Rodents—Focuses on common laboratory rodents and their use in research. Topics: rodent physiology, anatomy, reproduction, genetics (including strategies for induced mutations), strain differences, nomenclature, behavior, common diseases and how these may compromise research, and animal models. Practical aspects of basic husbandry, management of breeding colonies, animal identification, the appropriate design of animal experiments, and the role of environmental variables.

1 unit, Spr (Cork)

DEVELOPMENTAL BIOLOGY

Co-Chairs: Matthew Scott, Roeland Nusse

Professors: Gerald Crabtree, David Hogness, Dale Kaiser, Roeland Nusse, Matthew Scott, Lucy Shapiro, James Spudich, Irving Weissman

Associate Professors: Margaret Fuller, Stuart Kim

Assistant Professors: David Kingsley, Anne Villemauve

A fundamental problem in biology is how the complex set of multicellular structures that characterize the adult animal is generated from the fertilized egg. Advances at the molecular level, particularly with respect to the genetic control of development, have been explosive. These advances represent the beginning of a major movement in the biological sciences toward the understanding of the molecular mechanisms underlying developmental decisions and the resulting morphogenetic processes. This new thrust in developmental biology derives from the extraordinary methodological advances of the past decade in molecular genetics, immunology, and biochemistry. However, it also derives from groundwork laid by the classical developmental studies, the rapid advances in cell biology and animal virology, and from models borrowed from prokaryotic systems. Increasingly, the work is directly related to human diseases, including oncogene function and inherited genetic disease.

The Department of Developmental Biology includes a critical mass of scientists who are leading the thrust in developmental biology and who can train new leaders in the attack on fundamental problems of development. Department labs work on a wide variety of organisms from microbes to worms, flies, and mice. The dramatic evolutionary conservation of genes that regulate development makes the comparative approach of the research particularly effective. Scientists in the department labs have a very high level of interaction and collaboration. The discipline of developmental biology draws on biochemistry, cell biology, genetics, and molecular biology.

The department is located in the Beckman Center for Molecular and Genetic Medicine within the Stanford University Medical Center.

GRADUATE PROGRAM

MASTER OF SCIENCE

Students in the Ph.D. program in Developmental Biology may apply for an M.S. degree, assuming completion of their course requirements and preparation of a written proposal. The master's degree awarded by the Department of Developmental Biology does not include the possibility of minors for graduate students enrolled in other departments or programs.

Students are required to take, and satisfactorily complete, at least three lecture courses offered by the department, including Developmental Biology. In addition, students are required to take three courses outside the department. Students are also expected to attend Developmental Biology seminars and journal clubs. In addition, the candidate must complete a research paper proposing...
a specific experimental approach and background in an area of science relative to developmental biology.

**DOCTOR OF PHILOSOPHY**

The graduate program in Developmental Biology leads to the Ph.D. degree. The department also participates in the Medical Scientists Training Program in which individuals are candidates for both the M.D. and Ph.D. degrees.

Students are required to take, and satisfactorily complete, at least three lecture courses offered by the department, including Developmental Biology. In addition, students are required to take three courses outside the department. Students are also expected to attend Developmental Biology seminars and journal clubs.

Successful completion of a qualifying examination is required for admission to Ph.D. candidacy. The examination consists of two parts. One proposal is on a subject different from the dissertation research and the other proposal is on the planned subject of the thesis. The final requirements of the program include the presentation of a Ph.D. dissertation as the result of independent investigation and constituting a contribution to knowledge in the area of developmental biology. The student must then successfully pass the University oral examination which is taken only after the student has substantially completed his or her research. The examination is preceded by a public seminar in which the research is presented by the candidate. The oral examination is conducted by a dissertation reading committee.

**COURSES**

Course work and lab instruction in the Department of Developmental Biology conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

210. Developmental Biology—(Same as Biological Sciences 208.) Acquaints graduate students and upper-level undergraduates with advances in current developmental biology. Goal: to discover unifying themes in how organismic complexity is generated during embryonic and post-embryonic development. The roles of genetic hierarchies, induction events, cell lineage, maternal inheritance, cell-cell communication, and hormonal control in developmental processes in well-studied organisms (mammals, insects, and nematodes). Small groups of students and faculty discuss current papers in depth. Team taught by department faculty. Undergraduate prerequisite: consent of instructor. Recommended: familiarity with basic techniques and experimental rationales of molecular biology, biochemistry, and genetics.

2 units, Spr (Crabtree, Fuller, Hogness, Kaiser, Kim, Kingsley, Nusse, Scott, Shapiro, Spudich, Villeneuve, Weissman)

211. Development in Microorganisms—(Same as Biochemistry 211.) Cell differentiation and multicellular development in microorganisms. Microbes are attractive subjects for molecular studies of the regulation of development because they can be manipulated easily by genetic and biochemical techniques, handled in large numbers, and because their genomes are relatively small. Topics: temporal and spatial regulation of cell division; sporulation; flagella and pili morphogenesis; positional information; cell-cell communication and multicellular development; signal transduction pathways. Lectures/ readings in current literature.

2 units, Aut (Kaiser, Shapiro)

213. Biological Signaling during Development—(Same as Biochemistry 213.) Biochemical and genetic analysis of the developmental response of cells, or cell clusters, to specific molecular signals. Signals vary from complex proteins to simple molecules (steroid hormones), and the responding cells vary from those in close proximity to signal-generating cells to all cells in the organism. Focus is on the signaling mechanisms and on the evolutionary conservation of these systems. Prerequisites: knowledge of basic biochemistry and genetics.

3 units, Spr (Hogness)

215. Frontiers in Biological Research—(Same as Biochemistry 215.) Literature/discussion on how to critically evaluate current biological research. Held in conjunction with a Wed. seminar series hosted in alternate weeks by Biochemistry and Developmental Biology. Invited speakers present works in a particular system. Students and faculty read and critically discuss one or more papers from the primary research literature on a related topic before the seminar and then meet informally with the speakers to discuss the research and future directions. Emphasis is on how to read papers in the primary research literature, the set of techniques most commonly used to study problems in biology, and a comparison between genetic and biochemical approaches in biological research.

1 unit, Aut, Win (Krasnow, Kingsley, Villeneuve)

217. Mammalian Developmental Genetics—(Same as Genetics 217.) Topics: imprinting, early development and implantation, germ cell allotment, phenotypic consequences of targeted knockouts of developmental genes, home genes and other developmental genes in mammals, tumorogenesis, coat color mutations, classical mutations and positional cloning, mutagenesis and insertion and gene traps, growth controls and IGFs, muscle and limb development, sex determination, classical genetics and gene mapping and inbred strains, segregation and T locus, and germ and embryonic stem cells and terato-
carcinomas. Weekly lecture, plus guest lecture or a literature discussion.

2 units (Barsh, Nusse) given 1997-98 and every 3rd year

225. Molecular Motor Proteins and the Cytoskeleton—(Same as Biochemistry 225.) The molecular basis of energy transduction that leads to movements generated by microfilament-based and microtubule-based motors. In-depth analysis of forms of myosin, dynein, and kinesin and their roles in the cell as a model for understanding the structural, biochemical, and functional properties of biological machines in general. Topics: structure of the molecular motors and their accessory proteins, regulation of the function of motile assemblies in cells; spatial and temporal controls on the formation of motile assemblies in cells. Experimental approaches: genetic analysis, DNA cloning and expression, reconstitution of functional assemblies from purified proteins, x-ray diffraction, three-dimensional reconstruction of electron microscope images, spectroscopic methods, and high-resolution light microscopy. How a complex cellular process is analyzed at the molecular level by a multifaceted approach using biochemical, biophysical, and genetic techniques. Prerequisites: knowledge of basic biochemistry and cell biology.

3 units (Spudich, Fuller) not given 1997-98

237. Introduction to Biotechnology—(Same as Biological Sciences 237, Biochemistry 237, Chemical Engineering 237, Civil Engineering 237, Structural Biology 237.) Faculty from the departments of Biochemistry, Biological Sciences, Chemical Engineering, Civil Engineering, Developmental Biology, Structural Biology, and invited industrial speakers review the interrelated elements of modern biotechnology. Topics: protein structure and dynamics, protein engineering, biocatalysis, gene expression, cellular metabolism and metabolic engineering, fermentation technology, and purification of biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences or engineering.

3-5 units (Robertson) given 1998-99

399. Research—Must register by section numbers.

1-18 units, any quarter (Staff)

EPIDEMIOLOGY PROGRAM

Director: Jennifer L. Kelsey (Professor of Health Research and Policy)

Steering Committee: (Professors) J. Martin Brown (Radiation Oncology), Byron W. Brown, Jr. (Health Research and Policy, Division of Biostatistics), Jennifer L. Kelsey (Health Research and Policy, Division of Epidemiology), Helena Kraemer (Psychiatry, and Medicine), Robert Marcus (Medicine, Division of Endocrinology, Gerontology, and Metabolism), Alice S. Whittemore (Health Research and Policy, Division of Epidemiology)

Cancer Biology: J. Martin Brown (Professor)

Genetics: Neil Risch

Gynecology and Obstetrics: Emmet Lamb (Professor), Mary L. Polan (Professor)

Health Research and Policy: Paul Basch (emeritus), Rodney Beard (emeritus), Byron W. Brown, Jr. (Professor), John Farquhar (Professor), Jennifer Kelsey (Professor), Abby King (Assistant Professor), Lorene Nelson (Assistant Professor), Ralph Paffenbarger, Jr. (emeritus), Julie Parsonnet (Associate Professor), Atsuko Shibata (Assistant Professor), Alice Whittemore (Professor)

Medicine: John Farquhar (Professor), Stephen Fortmann (Associate Professor), James Fries (Professor), William Haskell (Professor), Halstead Holman (Professor), Helena Kraemer (Professor), Robert Marcus (Professor), Gordon Matheson (Associate Professor), Julie Parsonnet (Associate Professor), Charles Prober (Professor), Gary Schoolnik (Professor), Peter Small (Assistant Professor), Marcia Stefanik (Research Associate), David Thom (Assistant Professor), Lucy Tompkins (Professor), Marilyn Winkleby (Lecturer)

Microbiology and Immunology: Ann Arvin (Professor), Charles Prober (Professor), Gary Schoolnik (Professor), Lucy Tompkins (Professor)

Neurology and Neurological Sciences: Leslie Dorfman (Professor)

Neurobiology: Denis Baylor (Professor)

Pediatrics: Ann Arvin (Professor), Laura Bachrach (Associate Professor), Yvonne Maldonado (Professor), Charles Prober (Professor)

Stanford Center for Research in Disease Prevention: John Farquhar (Professor), Stephen Fortmann (Associate Professor), William Haskell (Professor), Abby King (Assistant Professor), Helena Kraemer (Professor), Marcia Stefanik (Research Associate), Marilyn Winkleby (Lecturer)

GRADUATE PROGRAMS

The Epidemiology Program offers interdisciplinary instruction and research opportunities leading to the M.S. and Ph.D. degrees in Epidemiology. The program has strengths in the following areas of epidemiology: cancer; cardiovascular, infectious, musculoskeletal and neurological diseases; genetics; some aspects of epidemiologic methods; and reproductive, environmental, and occupational epidemiology.
MASTER OF SCIENCE

The M.S. program is designed to provide training in epidemiologic methods to professionals in a variety of related fields and to serve as an introduction to those with bachelor’s degrees who are considering careers in epidemiology. Applicants to the M.S. program should have previous coursework in biology and statistics or mathematics.

To receive the degree, students are expected to obtain a thorough grounding in epidemiologic methods and applied biostatistics and to demonstrate research skills through the completion of a master’s thesis. A total of 45 units of course work, including a 12-credit master’s thesis, must be successfully completed. Required courses are Health Research and Policy (HRP) 203 (Intermediate Biostatistics), 225 (Design and Conduct of Epidemiologic Studies), 226 (Advanced Epidemiologic Methods), and 238 (Seminar/Journal Club in Epidemiology); Statistics 190 (Statistics for Social Scientists), and 161 (Introduction to Statistical Methods II); and a master’s thesis of 12 units or more. In addition, M.S. students are required to select two other courses in epidemiology. The master’s thesis must be read and approved by two faculty members.

DOCTOR OF PHILOSOPHY

The Ph.D. program in Epidemiology is designed to prepare individuals for careers in research and teaching in epidemiology. It is recommended that applicants have previous coursework in biology and statistics or mathematics. Normally, successful applicants will have a master’s degree in a relevant field or at least two years of relevant research experience.

Candidates for the Ph.D. degree must complete 72 units of graduate course work and research. Course requirements include all those listed for master’s students (unless taken previously), Health Research Policy 224 (Statistical Issues in Epidemiology), a course in genetic epidemiology or genetics, and an additional course in epidemiology. A student must select a specialty area (for example, cardiovascular diseases, cancer, genetics, infectious diseases, musculoskeletal diseases, neurologic diseases, reproductive disorders). Additional courses are required in each specialty area. Requirements for the specific specialty areas may be obtained from the office of the Program Coordinator, and depending on the specialty area, include one or more of the following courses: Pathology 230A (General and Special Pathology), Cancer Biology 241 (Molecular and Cellular Biology of Cancer), Genetics 344A (Genetic Epidemiology), Human Biology 166 (Cardiovascular Disease Prevention and Epidemiology), Health Research Policy 201 (Infectious Basis of Disease), Neuroscience 200 (The Nervous System), and Human Biology 156 (Human Development).

Successful completion of three written qualifying examinations is required for admission to Ph.D. candidacy. The qualifying examinations cover: (1) epidemiologic methods, (2) biostatistics, and (3) a specialty area (for example, epidemiology and pathobiology of cancer, or cardiovascular diseases). Requirements also include the presentation of a Ph.D. dissertation as the result of independent investigation and constituting a contribution to knowledge in epidemiology. The candidate must then successfully pass the University oral examination, which is taken only after the student has substantially completed his or her research. The examination is preceded by a public seminar in which the research is presented by the candidate. The oral examination is conducted by a dissertation reading committee.

COURSES

The course listings of individual departments participating in the Program in Epidemiology should be consulted for complete descriptions.

GENETICS

Emeritus: (Professor) L. L. Cavalli-Sforza
Chair: David Botstein
Associate Professors: Gregory S. Barsh, Michele P. Calos, Margaret T. Fuller
Assistant Professor: Douglas E. Vollrath
Professor (Research): Leonore A. Herzenberg

GRADUATE PROGRAMS

The Ph.D. program in the Department of Genetics offers graduate students the opportunity to study in all the major areas of modern genetics research, including many aspects of human genetics (linkage mapping, physical mapping, cytogenetics, genetic epidemiology and population genetics), bacterial and yeast genetics, Drosophila developmental genetics, mouse genetics, immunogenetics, and mathematical biology. The department also includes two Genome Centers, the Stanford Human Genome Mapping Center, and the Stanford DNA Sequence and Technology Center which are engaged in state-of-the-art mapping and sequencing of human and model organism genomes.

The department believes genetics should be viewed as a discipline that encompasses not just a set of tools but a coherent and fruitful way of thinking about biology and medicine. It emphasizes, in the teaching of doctoral students and
physician-scientists, the broad scope of genetic thinking, including not just molecular genetics, but also classical, medical, and population genetics. The department provides training, through laboratory rotations, dissertation research, a series of advanced courses in genetics and other areas of biomedical science, several seminar series and colloquia, journal clubs, and an annual three-day retreat that includes faculty, students, postdoctoral fellows, and staff scientists. A strong emphasis is placed on interactions among students, postdoctoral students, and faculty within the department and throughout the campus.

The Department of Genetics is located in the School of Medicine and includes modern, well-equipped laboratories. Extensive computer support and advanced instrumentation are available for research projects. The department has 25 to 30 graduate students and 30 to 35 postdoctoral fellows. In addition to interacting with the faculty and laboratories in the department, students have contacts with a much larger number of students, fellows, and faculty in other biological and biomedical programs throughout the University.

During their first year, graduate students in the department take advanced graduate courses and sample several areas of research by doing laboratory rotations in three or four labs in the department. At the end of the first year, students select a lab in which to do their dissertation research. While the dissertation research is generally performed in one lab, collaborative projects with more than one faculty member are encouraged. In addition to interacting with their faculty preceptor, graduate students receive input regularly from other faculty members who serve as advisers on their dissertation committee. Study for the Ph.D. generally requires between four and five years of graduate work, most of which is spent on the dissertation research.

Graduate students are generally enrolled in the Ph.D. program, although a limited number of M.D. candidates can combine research training in genetics with their medical studies. Ph.D. candidates who have passed the qualifying exam in the second year can opt to receive the M.S. degree. There are opportunities for graduate students to teach in graduate level and professional school courses, although there is no formal teaching requirement. In addition, students are encouraged to participate in an education outreach program that is administered through the department and which involves numerous opportunities to interact with secondary school students and teachers, lay groups, and local science museums.

Students who have recently received a bachelor’s, master’s, M.D., or Ph.D. degree in related fields may apply for graduate study in the Department of Genetics. Prospective students must have a background in general biology, mathematics, physics, and chemistry. Decisions for admission are based on a comparison of the relative merits of all the candidates’ academic abilities and potential for research. Students who wish to pursue a combined M.D./Ph.D. degree are considered for admission into the graduate program in the Department of Genetics after they have been admitted to the M.D. program in the School of Medicine. All applicants are considered equally regardless of race, color, creed, religion, national origin, sexual preference, age, or gender.

Students are admitted to the graduate program in the Autumn Quarter. Prospective students are encouraged to begin the application process early enough to ensure that they are able to submit a complete application by the previous December 15, and are able to apply for fellowships by the previous November 15. All students accepted into the Ph.D. program are provided with full tuition and a stipend to cover costs of living. Three training grants from the U.S. National Institutes of Health provide major support for the graduate training program in the department. Other student support is provided by department funds and from the research grants, both federal and private, of the faculty. In addition, a number of graduate students are funded by fellowships from the National Science Foundation or the Howard Hughes Medical Institute. Prospective students are encouraged to apply for fellowships from these institutes by requesting applications from the National Science Foundation, Oakridge Associated Universities, P.O. Box 3010, Oak Ridge, TN 37831-3010, telephone (615) 483-3344; Howard Hughes Medical Institute, Fellowship Office, National Research Council, 2101 Constitution Avenue, NW, Washington, D.C. 20418, telephone (202) 334-2872. Applications are due on November 1 of each year.

For basic University requirements for the Ph.D. degree, see the “Graduate Degrees” section of this bulletin.

COURSES

For further information on the availability of courses, consult the quarterly Time Schedule, or inquire at the department office. Additional courses in or related to genetics are included in the listings of the departments of Biological Sciences, Biochemistry, Developmental Biology, Microbiology and Immunology, and Structural Biology.

201. Human Genetics—The theoretical and experimental basis for human genetics. Lectures/reading in molecular, chromosomal, cellular, developmental, population, and medical genetics, emphasizing the latter. Prerequisites: knowledge of biochemistry and basic genetics.

4 units, Spr (Cox, Francke, Barsh)

203. Advanced Genetics—(Same as Biological Sciences 203.) Explores the genetic toolbox. Analytic methods and modern synthetic genetic manip-
ulation, including original papers. Emphasis is on use of genetic tools in dissecting complex biological pathways, developmental processes, and regulatory systems. Graduate students in any one of the biological sciences are welcome, but those with minimal experience in genetics should prepare themselves by working through problems in Suzuki, et al, or Hart, et al.

3 units, Aut (Stearns, Kim, Villeneuve)

209. Genetics of Vision and Vision Disorders—Background information about the developmental biology of the eye, the physiology of vision, and the biology of vision disorders that have a genetic basis. Examples of genetically-related research problems involving study of vision and/or vision disorders.

1 unit (Cohen) alternate years, given 1998-99

210. Advanced Human Genetics—For students in the Genetics Ph.D. program; other graduate students by arrangement. Companion course for 201. Advanced principles of human and medical genetics. In-depth discussion of human genetics; examples from recent literature. Emphasis is on molecular genetics and on experimental approaches.

2 units, Spr (Cox, Risch)

217. Mammalian Developmental Genetics—(Same as Developmental Biology 217.) Topics: imprinting, early development and implantation, germ cell allotment, phenotypic consequences of targeted knockouts of developmental genes, hox genes and other developmental genes in mammals, tumorigenesis, coat color mutations, classical mutations and positional clonning, mutagenesis and insertional and gene traps, growth controls and Lgs, muscle and limb development, sex determination, classical genetics and gene mapping and inbred strains, segregation and T locus, and germ and embryonic stem cells and teratocarcinomas. Weekly lecture, plus one guest lecture or a literature discussion.

2 units (Barsh, Nuie) given 1997-98 and every 3rd year

222. Method and Logic in Experimental Genetics—For graduate students only. Experimental design. Weekly topics central to research in genetics, biochemistry, and molecular biology: protein subunit equilibrium, domain structure of proteins, cooperativity, precursor/product relationships, and macromolecular interactions. Emphasis is on student participation and analysis of the logical principles underlying experiments in these areas. Papers, classic and contemporary, from primary literature relevant to the weekly topic.

3 units, Win (Myers, Vollrath)

231. Gene Therapy—Gene therapy, the nascent giant of medicine, is developing new vectors and disease applications. Approaches include viral and non-viral vectors, delivery methods, and target cells. History and ethical considerations. Lectures by Stanford faculty, as well as guest speakers from industry and other institutions. Students participate in question sessions after each lecture.

3 units, Spr (Blau, Carlos, Nolan)

344A. Genetic Epidemiology—(Same as Statistics 344A.) Methods for the design and analysis of studies in human genetics, focusing on the epidemiology of mendelian disorders and the genetic and environmental contributions to common, complex familial traits. Topics: study designs for assessing the importance of genetic factors (family, twin, and adoption studies); methods for determining modes of inheritance segregation analysis; identification and mapping of major genes through linkage analysis and disease-marker associations. Applications to birth defects, coronary heart disease, psychiatry, neurology, cancer, and immunology.

3 units, Win (Risch)

344B. Topics in Statistical Genetics—(Same as Statistics 344B.) In-depth discussion of statistical methods currently used in human genetic analysis. Topics change each year, depending on the interests of the students and instructors, including: concepts of likelihood as used in the genetic context; measures of familial aggregation, including issues of censoring and age-dependent data; genetic modeling of quantitative traits; mode of inheritance analysis, including segregation analysis; analysis of extended pedigrees; parametric and nonparametric approaches to linkage analysis and gene mapping, including family studies, radiation hybrid data, sperm typing and DNA contig mapping; linkage disequilibrium; analysis of DNA profiles for individual identification; DNA sequence analysis.

2 units (Risch) alternate years, not given 1998-99

344C. Genetic Epidemiology: Applications—Sequel to 344A, focusing on application of methods from genetic epidemiology to various diseases: family studies, segregation analysis, linkage analysis, and population association studies. The disease topics are tailored to the interests of the students, from cancer (breast or colon cancer), neurological disorders (multiple sclerosis, epilepsy), birth defects (cleft lip and palate, pyloric stenosis), psychiatry (schizophrenia, manic-depression, Alzheimer's disease), cardiovascular disease, autoimmune disease (diabetes, coeliac disease), etc.

2 units, Spr (Risch) alternate years, not given 1998-99

260. Supervised Study—Prerequisite: consent of instructor.

any quarter (Staff)

299. Directed Reading—Prerequisite: consent of instructor.

any quarter (Staff)

399. Individual Research—Prerequisite: consent of instructor.

any quarter (Staff)
GRADUATE PROGRAMS

The Program in Epidemiology and the Program in Health Services Research are housed in the Department of Health Research and Policy. These programs are described separately within the School of Medicine listings of this bulletin.

COURSES

Course work and instruction in the Department of Health Research and Policy conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this bulletin.

89Q. Stanford Introductory Seminar: Cross-Cultural Issues in Medicine—Preference to sophomores. Cross-cultural issues (ethnicity, immigration, language barriers, and service expectations) that impact the health system. Fosters an understanding of culturally unique and non-English speaking populations, and develops interpersonal and communication skills with diverse ethnic groups.
3 units, Win (Corso)

201. Infectious Basis of Disease—(Same as Microbiology and Immunology 201.) Introduction to the spectrum of human illness induced by viruses, bacteria, fungi, and medical parasites, including protozoans and helminths. Classification, epidemiology, transmission, pathogenesis, diagnosis, treatment, control, vaccination, and other preventive measures. Emphasis is on syndromic approach to disease. Lectures, demonstrations, lab sessions, and small group evaluation of clinical correlates. Use of interactive multimedia instructional program, Microbe. Labs, CPCs. Prerequisite: medical student status or consent of instructor.
9 units, Spr (Basch, Siegel)

202. Biostatistics and Epidemiology—Required for medical students. Introduces epidemiological concepts, techniques, and studies: statistical reasoning and the application of common statistical procedures used in lab and clinical investigations. Lectures, group discussions, and assigned problems.
4 units, Win (Lavori, Parsonnet)

203. Intermediate Biostatistics—(Same as Medical Information Sciences 203.) Introduction to advanced statistical procedures commonly used in health services and epidemiological research, e.g., multiple linear regression, multiple logistic regression, actuarial analysis of observations on time to event with censoring, and the analysis of frequency data by Poisson and chi-square methods. Examples presented and problems assigned. Prerequisite: 202, Statistics 201A, or consent of the instructor.
3 units, Spr (Staff)

205. Health and Society—Introduces issues in health care systems, organization, and financing
through lectures, panel discussions, and student projects.

2 units, Win (Baker, Hlatky)

206. Statistical Methods for Meta-Analysis—
(Same as Education 493B, Statistics 211.) Meta-analysis is a quantitative method for combining results of independent studies, and enables researchers to synthesize the results of related studies so that the combined weight of evidence can be considered and applied. Examples from the medical, behavioral, and social sciences. Topics: literature search, publication and selection bias, statistical methods (contingency tables, cumulative methods, sensitivity analyses, non-parametric methods). Project required. Prerequisites: basic sequence in statistics and consent of instructor.

1-3 units, Win (Olin)

209. Medicine and the Law—The interrelationships between the practice of medicine and legal principles. Topics: the definition of medical malpractice, informed consent, role and powers of the Board of Medical Quality Assurance, financing of health care, mandatory reporting requirements, physician/patient privileges, and human experimentation.

2 units, Win (Eaton)

210. Health Law and Policy—(Same as Law 313.) Non-law students admitted with consent of instructor. Open to all law or medical students and to graduate and undergraduate students, by consent of the instructor. Introductory survey of the American health care system and its legal and policy problems. Topics: the special characteristics of medical care compared to other goods and services, difficulties of assuring quality care, the complex patchwork of the financing system, and the ethical problems the system raises.

3 term units, Aut semester (Greely)


2 term units (Greely) not given 1997-98

212. Cross-Cultural Medicine—Provides interviewing and behavioral skills to facilitate culturally relevant health care across all population groups. Explicit and implicit cultural influences that are operative in a variety of formal and informal medical contexts.

3 units, Spr (Corso)

224. Statistical Issues in Epidemiology—Selected advanced problems in the design and analysis of epidemiological studies, motivated by published investigations. Possible topics: issues in matching controls to cases in case-control studies, methods for analyzing data from cohort studies, and methods for the design and analysis of family and genetic studies. Prerequisites: 203, 225, 226, or equivalents.

3 units (Whittemore)

alternate years, given 1998-99

225. Design and Conduct of Epidemiologic Studies—Intermediate-level. Provides students with the knowledge and skills to design, carry out, and interpret epidemiologic studies, particularly of chronic diseases. Topics: epidemiologic concepts, sources of data, cohort studies, case-control studies, cross-sectional studies, sampling, estimating sample size, questionnaire design, and effects of measurement error. Lectures/discussion, required reading, and assigned problems for each session. Prerequisite: 202 or equivalent, or consent of instructor.

3-4 units (Kelsey) not given 1997-98

226. Advanced Epidemiologic Methods—Emphasis is on principles of measurement, measures of effect, confounding, effect modification, and strategies for minimizing bias in epidemiologic studies. Lectures, readings, and problem sets. Prerequisite: 225 or consent of instructor.

3-4 units (Nelson) not given 1997-98

227. Epidemiology of Musculoskeletal and Neurologic Disorders—Epidemiologic contributions to understanding the etiology of conditions such as osteoporosis and fractures, congenital and developmental musculoskeletal disorders, arthritic disorders, disability, Alzheimer's disease and dementia, stroke, epilepsy, headache, chronic neurologic diseases, and head and back injuries. Methodologic issues important to the study of musculoskeletal and neurologic disorders are emphasized. Prerequisite: 225 or consent of instructors.

3 units (Kelsey, Nelson, Hubert)

alternate years, given 1998-99

228. Molecular Epidemiology—Examines molecular and biochemical biomarkers for measuring exposure, host susceptibility, and endpoint (disease), as applied to epidemiologic studies of infectious diseases, cancer, and other chronic diseases. Topics: DNA fingerprinting to determine transmission pathways; biochemical markers of environment exposures; study design and methodological consideration; ethical and legal issues. Prerequisite: 202 or 225, or consent of instructor.

3 units (Shibata, Parsonnet)

alternate years, not given 1998-99

230. Cancer Epidemiology—Lectures/discussions on key issues in cancer epidemiology. Topics: descriptive epidemiology and sources of incidence/mortality data; biological basis of carcinogenesis and its implications for epidemiologic research; methodological issues relevant to cancer research; causal inference; major environmental risk factors; genetic susceptibility; cancer control; examples of current research; and critique of the literature. Pre-
231. Epidemiology of Infectious Diseases—Principles of transmission of infectious agents (viruses, bacteria, rickettsiae, mycoplasma, fungi, and protozoan and helminth parasites). The role of vectors, reservoirs, and environmental factors. Pathogen and host characteristics that determine the spectrum of infection and disease. Endemicity, outbreaks, and epidemics of selected infectious diseases. Principles of control and surveillance.

3 units (Parsonnet)
alternate years, given 1998-99

238. Seminar/Journal Club in Epidemiology—On-going research is presented by faculty, staff, students, and guests, and recent journal articles are discussed.
1 unit, Aut, Win, Spr (Staff)

256. Economics of Health and Medical Care—(Same as Medical Information Sciences 256, Economics 156/256; undergraduates register for 156.) Institutional, theoretical, and empirical analysis of problems of health and medical care. Topics: institutions in the health sector; measurement and valuation of health; nonmedical determinants of health; medical technology and technology assessment; demand for medical care and medical insurance; physicians, hospitals, and managed care; international comparisons. Prerequisite: Economics 51 or consent of instructor. Recommended: some background in statistics or mathematics.
5 units, Aut (McClellan)

257. U.S. Health Policy—Introduction to the institutions and policies that influence health care provision and costs in the U.S. Topics: the organization of the health care delivery system, the structure of hospitals, physician organizations, and the health care networks, and the financing of health care, including health insurance, Medicare, and Medicaid. Current issues in health care policy.
3 units, Win (Baker)

260A,B,C. Workshop in Biostatistics—(Same as Statistics 260A,B,C.) Informal seminars and discussions of diverse problems in medical science, especially those for which statistical methods are necessary.
260A. 1-5 units, Aut (Olshen, Bloch, Brown, Efron, Hastie, Johnstone, Lavori)
260B. 1-5 units, Win (Olshen, Bloch, Brown, Efron, Hastie, Johnstone, Lavori)
260C. 1-5 units, Spr (Olshen, Bloch, Brown, Efron, Hastie, Johnstone, Lavori)

266. Cardiovascular Disease Epidemiology and Prevention—Epidemiological, biological, and behavioral perspectives of cardiovascular disease and assessment and modification of risk factors relating to it. The potential for disease prevention in the context of major prevention trials. Public policy ramifications. Topics: diet, weight control, smoking, Type-A behavior, and exercise. Prerequisites: Human Biology core or consent of instructor.
2-3 units (King) not given 1997-98

280. Spanish for Medical Students—(Same as Spanish 121M.) Teaches students useful conversational Spanish. Topics: the human body, hospital procedures, diagnostics, food, and essential phrases for on-the-spot reference when dealing with Spanish-speaking patients.
3 units, Aut (Corso)

281. Spanish II for Medical Students—(Same as Spanish 122M.) Can be taken as continuation of 280 or independently, depending on the level of knowledge.
3 units, Win (I. Corso)

282. Spanish III for Medical Students—(Same as Spanish 123M.) Can be taken as continuation of 280 or independently, depending on the level of knowledge.
3 units, Spr (I. Corso)

283. Core Seminar—Presentation of research in progress and tutorials in the field of health services research.
1 unit, Aut, Win, Spr, Sum (Garber, Hlatky, Owens)

299. Directed Reading—Aspects of preventive medicine, public health, social aspects of disease and health, economics of medical care, occupational or environmental medicine, epidemiology, international health, or related fields. Prerequisite: consent of the instructor.
1-18 units, any quarter (Staff)

390. Quality in Health Care—(Same as Business E333.) Topics: What do modern industrial quality theories have to offer health care? How can quality be measured? What are the tools of quality improvement? What are the costs of poor quality in health care? How can high quality lower costs? Students read recent literature and meet with local professionals concerned with health care quality. Prerequisite: consent of the instructor.
4 units, Aut (Enthoven)

391. Political Economy of Health Care in the United States—(Same as Business E331.) The financial and public policy context in which the health care system operates, and the issues in public policy controlling it in the public expenditure. Issues: financing and organization for the delivery of health care in the U.S., how various existing and proposed financing and organizational arrangements affect the allocation of resources, fee-for-service practice and health maintenance organizations, hospital investment decisions and regional planning, health care costs, and national health insurance. Prerequisite: graduate student.
4 units, Spr (Enthoven)
392. Cost-Benefit Analysis in Health Care—
(Same as Business E332, Medical Information Sciences 432.) For graduate students. How do you do cost-benefit analysis when the "output" is difficult or impossible to measure? How do M.B.A. analytic tools apply in health services? Study/discussion of the main literature on the principles of cost-benefit analysis applied to health care. Critical review of actual studies. Emphasis is on the art of practical application.

4 units, Aut (Enthoven, Garber)

399. Research—Qualified students undertake investigations sponsored by individual faculty members. Prerequisite: consent of the instructor.

1-18 units, any quarter (Staff)

HEALTH SERVICES RESEARCH PROGRAM

Director: Mark Hlatky (Professor, Health Research and Policy, and Medicine)

Executive Committee: Alan Garber (Associate Professor, Medicine), Mary Goldstein (Assistant Professor, Medicine), Mark Hlatky (Professor, Health Research and Policy, and Medicine), Douglas Owens (Assistant Professor, Medicine)

Participating Departments and Faculty:

Economics: Thomas MaCurdy (Professor), Mark McClellan (Assistant Professor)

Business: Alain Enthoven (Professor)

Health Research and Policy: Laurence Baker (Assistant Professor), Paul Barnett (Consulting Assistant Professor), Byron W. Brown (Professor), Victor Fuchs (Professor, emeritus), Mark Hlatky (Professor), Jennifer Kelsey (Professor), Philip Lavori (Professor, Research), Ciaran Phibbs (Consulting Assistant Professor), John Piette (Consulting Assistant Professor), Anita Stewart (Visiting Scholar)

Industrial Engineering: Margaret Brandeau (Professor)

Law: Henry Greely (Professor)

Medicine: Alan Garber (Associate Professor), Leslie Lenert (Assistant Professor), Douglas Owens (Assistant Professor)

Psychiatry: Rudolph Moos (Professor)

Sociology: Richard Scott (Professor)

GRADUATE PROGRAM

MASTER OF SCIENCE

The master's degree program in Health Services Research (M.S. in HSR) is designed to complement training in the medical and social sciences in preparation for careers in health services or health policy; for example, careers in medicine and nursing, in which responsibilities in administration and health policy are anticipated, and careers in health policy analysis in government, consulting firms, health planning agencies, education, business, or the law. The program provides specialized training in selected areas of health care policy and other health-related topics, in research methodology, and in the application of these skills to a specific research problem. Course work requirements, based on an individually-designed multidisciplinary curriculum, allow students to design a program of study suited to their individual backgrounds and interests.

Students who intend to pursue careers involving administration may wish to consider course work in the Graduate School of Business.

To receive the degree, students are expected to demonstrate knowledge of issues in health services research and the quantitative skills necessary for research in this area. Students must take at least 45 units of course work (9 of the units may be double-counted to meet other degree requirements) and write a University thesis. The course work requirements are:

1. At least 8 units from the following group of Health Research and Policy (HRP) core courses: 256, Economics of Health; 391, Political Economy of Health Care; 392, Cost-Benefit Analysis in Health Care.

2. At least 6 units of graduate-level statistics courses (that is, at the 200 level or above). The sequence of Statistics 201A, Data Analysis I; and HRP 203, Intermediate Biostatistics, is strongly recommended. HRP 202 does not count toward the statistics requirement.

3. At least 3 units of HRP 283, Core Seminar.

4. At least 15 units of HRP research credit from 299, Directed Reading; 399, Research.

5. An additional set of approved elective courses to complete the program total of at least 45 units. The HRP courses level 203 and above listed in this catalog, as well as the following courses from other departments, have been approved as electives: Economics 150, Economics and Public Policy; Engineering Economic Systems and Operations Research 252, Decision Analysis; Medical Information Sciences 210, Computer Applications in Medicine, and 211A, Computer-Assisted Medical Decision Making; Psychology 256, Decision and Judgment; Sociology 163, Organizational Decision Making, and 166, Organizations and Public Policy. Other courses may be used as electives subject to the approval of the faculty adviser and program director.

6. Background in health sciences equivalent to Human Biology 111, Human Physiology, or the Clinical Physiology series (Physiology 200-204), as well as experience equivalent to Medical Information Sciences 205, Introduction to Clinical Environments.
For additional information, address inquiries to the Program Administrator, Department of Health Research and Policy, Stanford University School of Medicine, HRP Redwood Building, Room T150, Stanford, California 94305-5405.

COURSES

The course listings of individual departments participating in the Health Services Research Program should be consulted for complete descriptions.

IMMUNOLOGY PROGRAM

Director: Mark M. Davis (Professor of Microbiology and Immunology)
Predoctoral Committee: Carol Clayberger (Associate Professor of Cardiothoracic Surgery and Pediatrics), Mark M. Davis (Professor of Microbiology and Immunology), Shoshana Levy (Professor of Medicine/Oncology), Joseph Lipsick (Associate Professor of Pathology), Irving Weissman (Professor of Pathology, and Developmental Biology), Dennis Hanson (student representative).

Participating Departments and Faculty:
Biological Sciences: Patricia P. Jones (Professor)
Cardiovascular Surgery: Carol Clayberger (Associate Professor, Research, and Pediatrics)
Chemistry: Harden M. McConnell (Professor)
Genetics: Leonard A. Herzenberg (Professor), Lenore Herzenberg (Professor, Research)
Medicine/Hematology/Bone Marrow Transplantation Program: Robert Negrin (Associate Professor)
Medicine/Immunology and Rheumatology: C. Garrison Fathman (Professor), Jane R. Parnes (Professor), Samuel Strober (Professor)
Medicine/Oncology: Gilbert Chu (Associate Professor, and Biochemistry), Ronald Levy (Professor), Shoshana Levy (Professor, Research)
Microbiology and Immunology: Yueh-Hsiu Chien (Associate Professor), Mark M. Davis (Professor), Hugh O. McDevitt (Professor)
Molecular and Cellular Physiology: Richard S. Lewis (Associate Professor)
Molecular Pharmacology: Garry P. Nolan (Assistant Professor, and Microbiology and Immunology)
Molecular Pharmacology: Phyllis Gardner (Associate Professor, and Med/Clinical Pharmacology, and of Cardiovascular Medicine)
Pathology: Eugene C. Butcher (Associate Professor), Michael Cleary (Associate Professor), Gerald R. Crabtree (Professor, and Developmental Biology), Edgar G. Engleman (Professor, and Med/Immunology and Rheumatology), Joseph S. Lipsick (Associate Professor), Elizabeth Mellins (Associate Professor), Sara

GRADUATE PROGRAMS

MASTER OF SCIENCE

Students in the Ph.D. program in Immunology may apply for an M.S. degree in Immunology, assuming completion of appropriate requirements. Students must complete:
1. Three full-tuition quarters of residency as a graduate student at Stanford.
2. At least 45 units of academic work, all of which must be in courses at or above the 100 level, 36 units of which must be at or above the 200 level.
3. Three quarters of graduate research (Immunology 300), consisting of rotations in the labs of three faculty members.
4. Course work in Immunology as follows: one course in basic immunology (Biology 230, Microbiology/Immunology 200 or equivalent); two-course sequence in Advanced Immunology (Immunology 200, 210); Principles of Biological Technologies (Microbiology/Immunology 215); Cell Biology of Physiological Processes (Molecular and Cellular Physiology 221).
5. Graduate-level biochemistry and molecular biology (Biochemistry 200, 201, or equivalents).
6. Course work in Immunology 311 (Seminar in Immunology).
7. Participation in journal clubs, and attendance at the weekly Immunology seminar and at the annual Stanford Immunology Retreat.
8. One written proposal and an exam before candidacy.

DOCTOR OF PHILOSOPHY

The interdepartmental Immunology Program offers instruction and research opportunities leading to a Ph.D. in Immunology. The goal of the program is to develop young investigators who have a solid foundation in immunology as well as related sciences and who can carry out innovative research. The program features a flexible selection of courses and seminars to enrich students' backgrounds, combined with extensive research training in the laboratories of the participating immunology faculty.
Students applying to the program typically have an undergraduate major in biological sciences, but majors in other areas are acceptable if the applicants have had sufficient course work in biology and chemistry. Formal application should be made by December 15. Applications are evaluated by the Immunology Predoctoral Committee based on scores on the GRE exams (including the subject test in either biology, biochemistry, or chemistry), which should be taken by the October test date; grades; evidence of prior research experience; letters of recommendation, including letters from research sponsor(s); and commitment to a career in biomedical research. Interested Stanford medical students are welcome to apply to the program; they should contact the program director.

Students admitted to the program are offered financial support covering full tuition, a living stipend, and insurance coverage. Applicants are urged to apply for independent fellowships such as from the National Science Foundation and the Howard Hughes Medical Institute. Fellowship applications are due in November of the year prior to matriculation in the graduate program. Because of the small number of funded slots, students who have been awarded an outside fellowship will have an improved chance of acceptance into the program.

On matriculation, each student is assigned an adviser from the Immunology Predoctoral Committee who assists in selecting courses and lab rotations in the first year and in choosing a lab for the dissertation research. Once a dissertation adviser has been selected, a dissertation committee consisting of at least two Immunology faculty, including the dissertation adviser, is constituted to guide the student during the dissertation research. The student must meet with the dissertation committee at least once a year.

Candidates for Ph.D. degrees at Stanford must satisfactorily complete a three-year program of study that includes 72 units of graduate course work and research and nine full-tuition quarters of residency. At least 3 units must be taken with each of four different Stanford faculty members. For further information on University requirements, see the “Graduate Degrees” section of this bulletin.

The requirements for the Ph.D. degree in Immunology include the following:

1. Training in biology and cognate disciplines equivalent to that provided by the undergraduate Biology major at Stanford.
2. Completion of the following courses (or their equivalents from undergraduate work):
   a) Basic immunology (Biology 230 or Microbiology and Immunology 200)
   b) Advanced Immunology (Immunology 201, 202)
   c) Biochemistry and molecular biology, graduate level (Biochemistry 200, 201)
   d) Cell Biology of Physiological Processes (Molecular and Cellular Physiology 221)
   f) Statistics (Biology 141 or Health Research and Policy 202)
   g) Principles of Biological Technologies (Microbiology/Immunology 215)
3. Students in their second year and above must participate in the Seminar in Immunology (Immunology 311); students who have not yet achieved TGR status must register for 1 unit. Students attend the weekly Immunology Seminar Series (12-1 p.m. Tuesdays). Students read the papers of and have dinner with visiting seminar speakers two or three times each quarter, and meet with a faculty member to discuss the material.
4. Elective courses as agreed upon by the student, adviser, and advisory committee. Electives may be chosen from graduate courses and seminars in any of the biomedical science departments and programs.
5. Completion in the first year of three one-quarter rotations of research in immunology labs.
6. Teaching assistantship in two immunology courses.
7. For admission to candidacy, completion of two requirements by the end of the second year: a comprehensive written examination in immunology and related biomedical sciences must be completed satisfactorily by the end of Autumn Quarter of the second year. Finally, students must prepare and defend a research proposal on their dissertation research by the end of the second year. Administration and evaluation of these requirements is the responsibility of the student’s dissertation committee.
8. Participation (through regular attendance and oral presentation) in one of the faculty-sponsored immunology journal clubs for at least the first two years. Students are also expected to attend the graduate students’ journal club, the Tuesday afternoon immunology seminars, and the annual Stanford Immunology Scientific Conference.
9. Passing of the University oral examination on the dissertation research, which is to be taken only after the student has substantially completed the research. The examination is preceded by a public seminar in which the candidate presents his/her research.
10. Completion of a Ph.D. dissertation, resulting from independent investigation and constituting a contribution to knowledge in the area of immunology.

**COURSES**

Course work and lab instruction in the Immunology Program conform to the Policy on the Use of Vertebrate Animals in Teaching Activitites as stated in the back of this catalog.
201, 202. Advanced Immunology—(Same as Microbiology and Immunology 211, 212.) For graduate students and advanced undergraduates. Lecture/discussion featuring current problems in immunology. Topics: genetics and structure/function relationships of antibodies, T-cell receptors, MHC antigens; accessory molecules; lymphocyte differentiation and activation; cellular regulation of immune responses; autoimmunity and other problems in clinical immunology. Prerequisites: biochemistry, basic immunology, consent of instructor (for undergraduates).

201. 3 units, Win (Chien, Staff)
202. Prerequisite: 201.
3 units, Spr (Staff)

215. Principles of Biological Technologies—(Same as Microbiology and Immunology 221.) The principles underlying commonly utilized technical procedures in biological research. Lectures on gel electrophoresis, nucleic acid hybridization, protein purification and stabilization, light microscopy and computer search algorithms for protein and nucleic acid databases.

2 units, Aut (Staff)

290. Teaching of Immunology—Practical experience in teaching by serving as a teaching assistant in an immunology course.

(Staff)

300. Research—Research for graduate students in the Ph.D. program in Immunology.
1-15 units (Staff)

311. Seminar in Immunology—Enrollment limited to graduate students (second-year and above) in the Ph.D. Program in Immunology. Discussion of current research topics in immunology. Students read and discuss papers of speakers in the Immunology Seminar Series and meet with the speakers to discuss their research.

1 unit, Aut, Win, Spr (Staff)

MEDICAL INFORMATION SCIENCES PROGRAM

Committee: (Chair and Program Director) Edward H. Shortliffe; (Co-Director) Lawrence M. Fagan; Russ B. Altman, Douglas L. Brutlag, Parvati Dev, Alan M. Garber, Leslie Lenert, Mark A. Musen, Yuval Shahar, G. Wiederhold

Participating Faculty by Department:

Anesthesia: David M. Gaba (Associate Professor)
Biochemistry: Douglas L. Brutlag (Associate Professor)
Biostatistics: Byron W. Brown, Jr. (Professor)
Business: Alain C. Enthoven (Professor)

Computer Science: Russ B. Altman (Assistant Professor, by courtesy), Thomas O. Binford (Professor, Research), Edward A. Feigenbaum (Professor), Richard E. Fikes (Professor, Research), Michael L. Genesereth (Associate Professor), Marc Levoy (Associate Professor), Mark A. Musen (Associate Professor, by courtesy), Edward H. Shortliffe (Professor, by courtesy), G. Wiederhold (Professor, Research)

Economics: Alan M. Garber (Associate Professor, by courtesy)

Education: Lee S. Shulman (Professor), Richard E. Snow (Professor, emeritus)

Electrical Engineering: Marc Levoy (Associate Professor), G. Wiederhold (Professor, Research)

Engineering-Economic Systems and Operations Research: Samuel Holtzman (Consulting Associate Professor), Ronald A. Howard (Professor), Ross D. Shachter (Associate Professor)

Genetics: David Botstein (Professor), Stanley N. Cohen (Professor)

Health Research and Policy: Byron W. Brown, Jr. (Professor), Alan M. Garber (Associate Professor, by courtesy), Mark A. Hlatky (Associate Professor), John Hornberger (Assistant Professor), Richard A. Olshen (Professor)

Medicine: Russ B. Altman (Assistant Professor), Terrance Blaschke (Professor), Robert W. Carlson (Professor), Lawrence M. Fagan (Senior Research Scientist), James F. Fries (Professor), Alan M. Garber (Associate Professor), Max Henrion (Consulting Associate Professor), Joshua Lederberg (Consulting Professor), Leslie Lenert (Assistant Professor), Mark A. Musen (Associate Professor), Douglas K. Owens (Assistant Professor), Richard L. Popp (Professor), Glenn Rennels (Consulting Assistant Professor), Thomas C. Rindfleisch (Senior Research Scientist), Yuval Shahar (Senior Research Scientist), Edward H. Shortliffe (Professor), Michael Walker (Consulting Assistant Professor)

Obstetrics and Gynecology: Emmet J. Lamb (Professor)

Pathology: Howard H. Sussman (Professor)

Radiology: Gary M. Glazer (Professor), Gary H. Glover (Professor), H. K. Huang (Visiting Professor), Sandy A. Napel (Associate Professor), Norbert J. Pelc (Professor)

Surgery: Parvati Dev (Senior Research Scientist), Adam Seiver (Clinical Assistant Professor)

This interdisciplinary program was created in response to a recognized need for well-trained researchers and academic leaders in the expanding field of medical information sciences (medical informatics).

Stanford University's extensive computing facilities are described in the "Computer Science" section of this bulletin. In addition, the Medical
Information Sciences Program has a network of Macintosh, IBM, DEC, SGI, SUN, and Hewlett-Packard workstations. These machines are available for course work and research projects by trainees in the program.

GRADUATE PROGRAMS

The Medical Information Sciences Program is interdepartmental and offers instruction and research opportunities leading to M.S. and Ph.D. degrees in Medical Information Sciences (MIS). All students are required to complete the core curriculum requirements outlined below. Students who fail to maintain a 3.0 grade point average (GPA) in a category of the core curriculum are expected to pass a comprehensive exam in that area before the graduate degree is granted. In addition, all degree candidates must pass an oral examination that tests the student’s ability to integrate the various components of the curriculum and to relate them to the overall field of medical information sciences.

The core curriculum is common to all degrees offered by the program but is adapted or augmented depending on the interests and prior experience of the student. Deviations from the core curriculum outlined below must be justified in writing and approved by the student’s MIS academic adviser and the chair of the MIS Committee. It should be noted, however, that the program is intended to provide flexibility and to complement other opportunities in applied medical research that exist at Stanford (for example, the Program on Engineering in Biology and Medicine). Although most students are expected to comply with the basic program of study outlined here, special arrangements can be made for those with unusual needs or those simultaneously enrolled in other degree programs within the University. Similarly, students with prior training in the health professions (for example, degrees in medicine, dentistry, veterinary medicine, or pharmacy), or in medical librarianship, will have the curriculum adjusted to eliminate requirements that were met as part of their prior training. For example, through a special arrangement with Case Western Reserve School of Nursing (Cleveland, Ohio), there are opportunities to coordinate two years of nursing training at Case Western with two subsequent years of M.S. training at Stanford.

CORE CURRICULUM

All students are expected to participate regularly in the MIS Journal Club (201) and Colloquia (200). In addition, all students are expected to fulfill requirements in the following five categories:

1. Medical Informatics (16 units): students are expected to understand current applications of computers in medicine and to develop a broad appreciation for research in the management of biomedical information. Required courses are MIS 210 (Computer Applications in Medicine), 211 (Computer-Assisted Medical Decision Making), 212 (Project Course), 214 (Algorithms and Representations for Molecular Biology), and 215 (Medical Imaging Informatics).

2. Computer Science (10 units): the student is expected to acquire a knowledge of the use of computers, computer organization, programming, and symbolic systems. It is assumed that students have had prior computing experience at least equivalent to Computer Science (CS) 109A,B. All students are required to take a minimum of 10 units of courses in the Department of Computer Science. If similar courses have not been taken previously, these units must be CS 110 or 193U, and additional units taken among CS 145 or 245, 161, 221 or 228A. With the exception of CS 110, all other courses applied to the degree requirements must be numbered 137 or higher.

3. Decision Theory and Statistics (10-12 units): students are expected to learn basic probability theory, Bayesian statistics, decision analysis techniques, and experimental design techniques. Prior courses in statistics at least equivalent to Statistics 60, and calculus equivalent to Math. 42 are prerequisites. A prior course in linear algebra equivalent to Math. 113 is recommended. Required courses are Statistics 116 (Theory of Probability) or Engineering-Economic Systems and Operations Research (EES&OR) 221 (Probabilistic Analysis); Statistics 200 (Introduction to Statistical Inference) or 201 (Statistical Methods) or MIS 203 (Intermediate Biostatistics); and EES&OR 252 (Decision Analysis).

4. Biomedicine (6-10 units): students are expected to acquire a basic knowledge of human physiology, anatomy, and disease. Prior courses in biology at least equivalent to Biology 31 and 32 are prerequisites. Required are MIS 204, or 6 units of the Clinical Physiology series (Physiology 200-204), or Surgery 101 (Human Structure). Also required are Clinical Diagnosis (MIS 202) and Introduction to Clinical Environments (MIS 205).

5. Health Policy/Social Issues (5-7 units): candidates are expected to be familiar with key issues regarding public health policy, financing, ethics, and legal topics. Students are expected to take MIS 250 (Health and Society). A second course may be selected from among MIS 256, MIS 432, Health Research and Policy (HRP) 220/Human Biology 40 (Social Controversy and Policy Analysis in Medicine), Symbolic Systems 100 (Computers and Ethics), HRP 390 (Quality Assurance in Health Care), HRP 391 (Political Economy of Health Care),
HRP 392 (Cost-Benefit Analysis in Health Care), or any other advanced course in health policy/social issues proposed by the student and approved by the MIS academic adviser.

The core curriculum generally entails a minimum of 47 units of course work, but can require substantially more or less depending upon the courses selected and the previous training of the student. The varying backgrounds of students are well recognized and no one is required to take courses in an area in which he or she has already been adequately trained; under such circumstances, students are permitted to skip courses or substitute more advanced work. Students design appropriate programs for their interests with the assistance and approval of their MIS academic adviser.

MASTER OF SCIENCE

This degree is designed for individuals who wish to undertake in-depth study of medical informatics. The University's basic requirements for the master's degree are discussed in the "Graduate Degrees" section of this bulletin. Normally, a student spends two years in the program and will implement and document a substantial project during the second year. The first year involves acquiring the fundamental concepts and tools through course work and research project involvement. Graduates of this program are prepared to contribute creatively to basic or applied projects in medical informatics.

PROGRAM REQUIREMENTS

Programs of at least 54 units that meet the following guidelines are normally approved:

1. Completion of the core curriculum.
2. A minimum of 6 additional units composed of courses in Medical Information Sciences numbered 228 or higher, courses in Computer Science numbered 137 or higher, courses in Engineering-Economic Systems and Operations Research or Statistics numbered 200 or higher, Psychology 256 or 267, or relevant courses in other departments approved by the student's academic adviser.
3. Electives: additional courses to bring the total to 54 or more units.

MASTER OF SCIENCE (SPECIAL PROGRAM)

This special program is designed as postdoctoral training for individuals with established research credentials who may wish to acquaint themselves broadly with the field of medical information sciences, emphasizing formal course work. Candidates are required to complete the core curriculum and to supplement course work with approved electives to obtain a total of 42 units. A research project is encouraged but not required. Candidates are permitted to complete the program in no less than four quarters. Students in this program are drawn from applicants with doctoral degrees in medicine, computer science, decision theory, or related fields; for example, an academic physician on sabbatical might wish to undertake this program of study. The degree is designed to allow its graduates to complement their area of primary academic or research activity by providing them with a heightened ability to work effectively in collaborative research projects.

DOCTOR OF PHILOSOPHY

Individuals wishing to prepare themselves for careers as independent researchers in medical informatics should apply for admission to the doctoral program. The University's basic requirements for the doctorate (residence, dissertation, examination, and so on.) are discussed in the "Graduate Degrees" section of this bulletin. The following are additional requirements imposed by the MIS Interdisciplinary Committee:

1. A student should plan and successfully complete a coherent program of study including the core curriculum, oral examination, and additional requirements for the master's program. In addition, doctoral candidates are expected to complete two additional courses totaling at least 6 additional units of advanced course work (see categories under item '2' of the master's program requirements). The master's requirements, including the oral examination, should be completed by the end of the second year in the program (six quarters of study, excluding summers). Doctoral students are generally advanced to Ph.D. candidacy after completing the oral examination. A student's academic adviser has primary responsibility for the adequacy of the program, which is regularly reviewed by the Graduate Study Committee of the MIS program.

2. To remain in the Ph.D. program, each student must attain a grade point average (GPA) as outlined in the master's programs above, and must pass a comprehensive exam covering introductory level graduate material in any curriculum category in which he or she fails to attain a GPA of 3.0. The student must fulfill these requirements and apply for admission to candidacy for the Ph.D. by the end of six quarters of study (excluding summers).

3. By the end of nine quarters (excluding summers), each student must orally present a thesis proposal to a dissertation committee that generally includes at least one member of the Graduate Study Committee of the MIS program. The committee determines whether the student's general knowledge of the field, and the details of the planned thesis, are sufficient to justify proceeding with the dissertation.
4. As part of the training for the Ph.D., each student is required to complete 2 units of teaching assistant service in MIS courses, 1 unit (10 hours per week for one quarter) being required during the first two years as evidence of satisfactory progress toward the degree.

5. The most important requirement for the Ph.D. degree is the dissertation. Prior to the oral dissertation proposal and defense, each student must secure the agreement of a member of the program faculty to act as dissertation adviser. In some cases, the adviser need not be an active member of the MIS program faculty.

6. No oral examination is required upon completion of the dissertation. The oral defense of the dissertation proposal satisfies the University oral examination requirement.

7. The student is expected to demonstrate an ability to present scholarly material orally and present his or her research in a lecture at a formal seminar.

8. The student is expected to demonstrate an ability to present scholarly material in concise written form. Each student is required to write a paper suitable for publication, usually discussing his or her doctoral research project. This paper must be approved by the student’s academic adviser as suitable for submission to a refereed journal before the doctoral degree is conferred.

9. The dissertation must be accepted by a reading committee composed of the principal dissertation adviser, a second member of the program faculty, and a third member chosen from anywhere within the University. The principal adviser and at least one of the other committee members must be Academic Council members.

COURSES

200. Medical Informatics Colloquium—Series of colloquia offered by program faculty, students, and occasional guest lecturers. Credit available only to students in an MIS degree program. (May be taken no more than three times for credit.)

1 unit, Aut, Win, Spr

201. Medical Informatics Student Seminar—For all students and faculty. Participants report on recent relevant articles from the MIS literature or their research projects. Credit available only to students in an MIS degree program. (May be taken no more than three times for credit.)

1 unit, Aut, Win, Spr

202. Clinical Diagnosis—Open only to students in an MIS degree program. Designed for learning techniques of interviewing and symptom analysis through the study of a variety of common and well-defined clinical entities, and by role-playing in a problem-solving setting.

2 units

203. Intermediate Biostatistics—(Same as Health Research and Policy 203.) Introduction to advanced statistical procedures commonly used in health services and epidemiological research, e.g., multiple linear regression, multiple logistic regression, actuarial analysis of observations on time to event with censoring, and the analysis of frequency data by Poisson and chi-squared methods. Examples presented and problems assigned. Prerequisite: Statistics 201A, Health Research and Policy 202, or consent of the instructor.

3 units, Spr (Staff)

204. Human Physiology for Informatics—System by system review of physiology, emphasizing important physiological concepts/systems for information technology. Topics: basic molecular biology, cellular physiology, and coverage of basic physiological systems (nervous, cardiovascular, renal, immune, pulmonary, gastrointestinal, and endocrine). Applications of biomedical information technology in each of these areas. Prerequisites: 210, consent of instructor.

3-5 units (Altman)

205. Introduction to Clinical Environments—Open only to students in an MIS or Health Services Research degree program who are not enrolled in the M.D. program and do not have an M.D. degree. One half day per week is spent becoming familiar with a variety of clinical settings at Stanford Medical Center and the Veterans Administration Medical Center. Selected faculty introduce assigned students to the medical wards, outpatient clinics, emergency room, operating room, intensive care unit, psychiatry ward, and clinical lab. Meeting time is adjusted to suit the student’s class schedule.

1 unit

210. Computer Applications in Medicine—(Same as Computer Science 270.) Survey of use of computers in the medical field, including a variety of research and applied environments and the factors that influence the acceptance of these applications. Topics: integration of computer systems in the medical center, hospital information systems, electronic medical records and networking, bibliographic search, applications to molecular biology, aids for disabled patients, image processing, computer-aided instruction, decision support systems.

3 units, Aut (Fagan, Shortliffe)

211. Computer-Assisted Medical Decision Making—(Same as Computer Science 271.) For undergraduates or graduate students. Overview of concepts in medical decision making and survey of methods for the implementation of such concepts in computer-based clinical decision-support tools. Emphasis on Bayesian statistics, decision analysis, neural networks, artificial intelligence/expert systems, belief networks, and the synergies among
such approaches. Prerequisite: at least one programming course.

3 units, Win (Shortliffe)

212. Medical Informatics Project Course—(Same as Computer Science 272.) For students who have completed 210, 211, or 214, and who wish to implement those ideas in a computer program. Prerequisites: programming experience, 210, 211, or 214.

3 units, Spr (Fagan)

214. Algorithms and Representations for Molecular Biology—(Same as Computer Science 274.) Introduction to basic computational issues and methods used in molecular biology, including access and use of biological data sources on World-Wide-Web. Topics: basic algorithms for alignment of biological sequences and structures, and advanced representational and algorithmic issues in structure and sequence computation (e.g., dynamic programming algorithms for alignment, structural superposition algorithms, simplified representations, probabilistic representations of structural uncertainty, hidden Markov models, Bayesian networks, statistical feature detection, genetic algorithms, constraint satisfaction, minimum description length encoding, and knowledge-based approaches). Guest lectures on computational approaches pursued by research groups at Stanford. Prerequisites: programming skills, Math. 103, or equivalents. Recommended: familiarity with biology.

4 units, Spr (Altman, Koza)

215. Medical Imaging Informatics—Introduction to image informatics. Digital image formation, processing, storage, retrieval, manipulation, and transformation. Emphasizes the informational aspects of an image, the additional value acquired by an image as it is processed, and the information value of an image in various application contexts. Prerequisite: college level physics.

3 units, Win (Dev)


3 units, Win (Shachter)

230. Seminar on Knowledge Acquisition for Expert Systems—For graduate students. Discussion of experimental approaches to the construction of expert-system knowledge bases. Topics: interviewing techniques, formal and informal approaches to modeling expert knowledge, and automated tools that facilitate knowledge acquisition. Enrollment limited to 20. Prerequisite: Computer Science 228A or equivalent.

2 units (Musen)

alternate years, given 1998-99

231. Computational Molecular Biology—(Same as Biochemistry 218.) For molecular biologists and computer scientists desiring to understand the representation and analysis of biological sequences and structures. New and various existing methods and the strengths and limitations evaluated. Assignments utilizing the tools described. Topics: introduction to the Internet, accessing molecular databases, pattern search, classification of sequence and structure, alignment of sequences, rapid similarity searching, phylogenies, consensus sequencing, physical mapping of DNA and genomes, representing protein structure, and modeling protein structure by homology. Final project utilizes or analyzes the methods presented. Lecture/lab. Enrollment limited to 40. Prerequisite: introductory molecular biology at the level of Biology 31 or consent of instructor. Recommended: prior exposure to personal computers, electronic mail, and typing skills.

3 units, Aut (Brutlag)

239. Computer-Based Medical Education—Directed reading and research for graduate-level students in the use of modern hypermedia techniques in education. Possible topics: replacement of a lecture or a lab session, primary learning material (an electronic book), review material (question banks), and clinical cases from summaries to simulations.

1-6 units, any quarter (Dev)

256. Economics of Health and Medical Care—(Same as Economics 156/256, Health Research and Policy 256.) Institutional, theoretical, and empirical analysis of problems of health and medical care. Topics: institutions in the health sector; measurement and valuation of health; nonmedical determinants of health; medical technology and technology assessment; demand for medical care and medical insurance; physicians, hospitals, and managed care; international comparisons. Prerequisite: 51 or consent of instructor, some background in statistics or mathematics helpful.

5 units, Aut (McClellan)

278. Knowledge Representation and Reasoning under Uncertainty—(Enroll in Computer Science 228.)

3 units, Win (Koller)

299. Directed Reading and Research—For students wishing to receive credit for directed reading or research time.

any quarter
301. Special Topics in Medical Informatics
1-6 units, any quarter (Staff)

354. Probabilistic Reasoning in Computing—
(Enroll in Computer Science 354.)
3 units (Buntine, Cheeseman)
alternate years, given 1998-99

432. Cost-Benefit Analysis in Health Care—
(Same as Business E332, Health Research and Policy 392.) How do you do cost-benefit analysis when the “output” is difficult or impossible to measure? How do the M.B.A. analytic tools apply in health services? Study/discussion of the main literature on the principles of cost-benefit analysis as applied to health care. Critical review of actual case studies. Emphasis is on the art of practical application.
4 units, Aut (Enthoven, Garber)

MICROBIOLOGY
AND IMMUNOLOGY

Emeriti: (Professors) Sidney Raffel, Leon T. Rosenberg, John P. Steward, Bruce A. D. Stocker*; (Research Professor) Esther M. Lederberg

Chair: Edward S. Mocarski

Professors: Ann Arvin (jointly with Pediatrics), John C. Boothroyd, Mark M. Davis, Stanley Falkow, Harry B. Greenberg (jointly with Gastroenterology), A. C. Matin, Hugh O. McDevitt, Edward S. Mocarski, Peter Parham (jointly with Structural Biology), Charles Prober (jointly with Pediatrics), Gary K. Schoolnik (jointly with Infectious Diseases and Geographic Medicine), Lucy S. Tompkins (jointly with Infectious Diseases and Geographic Medicine)

Associate Professors: Yueh-hsiu Chien, Kasturi Haldar, Karla Kirkegaard, Peter Sarnow

Assistant Professors: Peter Jackson (jointly with Pathology), Garry Nolan (jointly with Molecular Pharmacology), David Relman (jointly with Infectious Diseases and Geographic Medicine)

Courtesy Associate Professor: Peter O’Hanley

*Recalled to active duty.

The Department of Microbiology and Immunology offers a program leading to the Ph.D. degree. In addition, research experience, courses, and seminars are offered to postdoctoral trainees and medical students. Current research interests include genetics, molecular and cell biology of host/parasite interactions; pathogenesis of bacterial and viral interactions; microbial physiology with emphasis on energetics and regulation; and molecular genetic studies of the immune system, animal viruses, and parasites.

GRADUATE PROGRAMS
MASTER OF SCIENCE

The department does not offer a regular M.S. program, but the degree is awarded under special circumstances. Candidates for master’s degrees are expected to have completed the preliminary requirements for the B.S. degree, or the equivalent. In addition, the candidate is expected to complete 45 quarter units of work related to microbiology; at least 25 of these units should concern research devoted to a thesis. The thesis must be approved by at least two members of the department faculty. There is also an oral examination, which may cover the general fields of the department’s offerings.

DOCTOR OF PHILOSOPHY

Application, Admission, and Financial Aid—Prospective Ph.D. candidates should possess a bachelor’s degree in a discipline of biology or chemistry, including course work in biochemistry, molecular biology, chemistry, and genetics. The deadline for receipt of applications with all supporting materials is December 15.

Applicants must file a report of scores on the general subject tests (normally in cellular and molecular biology, chemistry, or biochemistry) of the Graduate Record Examination (GRE). It is strongly recommended that the GRE be taken before October so that scores are available when applications are evaluated.

In the absence of independent fellowship support, entering predoctoral students are fully supported with a stipend and tuition award. Successful applicants have been competitive for predoctoral fellowships such as those from the National Science Foundation and Howard Hughes Medical Institute.

Program for Graduate Study—The Ph.D. degree requires course work and independent research demonstrating an individual’s creative, scholastic, and intellectual abilities. On entering the department, students meet with their designated adviser and together they design the basic timetable for completion of the degree requirements. Typically, this consists of first identifying gaps in the student’s undergraduate education and determining which courses should be taken. Then, a tentative plan is made for two to four lab rotations (one rotation per quarter). During the first year of graduate study in the department, each student also takes five upper-level (200-series) courses. Three of these courses, Principles of Biotechnologies, Microbial Pathogenesis, and Immunology, are specific requirements of this department. Two courses, Advanced Genetics and Cell Biology, are part of the “core curriculum” that is required of many graduate students in Stanford Biosciences.
In Autumn Quarter of the second year, each student defends orally a formal research proposal on a topic outside the intended thesis project. The outline of this proposal is due to the Graduate Program Steering Committee by January 30th. Based on successful performance on this proposal, the student is admitted to candidacy. In the Autumn Quarter of the third year, a research proposal based on the student’s own thesis topic is defended to his or her thesis committee. Teaching experience and training are also part of the graduate curriculum. All graduate students are required to act as teaching assistants for two quarters. In addition, first- and second-year graduate students are required to participate in a bi-weekly journal club.

COURSES

25N. Stanford Introductory Seminar: Modern Plagues—Preference given to freshman. The molecular and medical aspects of several new and old microorganisms that infect. Goal: place modern human plagues in scientific and historical perspective and provide an introduction to the fields of molecular biology and microbiology.
2 units, Aut, Win, Spr (Boothroyd, Kirkegaard, Haldar)

115A. Humans and Viruses: Overview of Human Virology—(Same as Human Biology 115A.) Topics illustrate important concepts in biology and the social sciences, focusing on emerging infections, viral classification, transmission and prevention, vaccination and treatment, eradication of disease, viral pathogenesis, mechanisms of virally-induced cancer, and viral evolution. Topics: molecular biology of genetic shift and drift in influenza virus, cellular tropism of HIV, development biology of virally-induced birth defects, clinical aspects of infantile diarrhea, social aspects of the common cold, policy issues of blood antibody tests, factors in pathogenesis and transmission of prions. Prerequisites: Human Biology core or consent of instructor. 6 units, Win (Siegel)

115B. Seminar: The Vaccine Revolution—(Same as Human Biology 115B.) Advanced seminar: human aspects of viral disease, focusing on recent discoveries, especially in the area of vaccine development and emerging infections. Journal club format: students select articles from primary scientific literature, write formal summaries, and synthesize into a literature review on a specific topic. Emphasis is on development of critical reading, analysis, experimental design, and interpretation of data. Students give four oral presentations and lead discussions based on their scientific journal reading. Enrollment limited to 10. Prerequisites: 115A, consent of instructor. 5 units, Spr (Siegel)

185. Topics in Microbiology—Introduction to microbiology: diversity, molecular regulation, growth, bioenergetics, and unique metabolic processes. Prerequisites: Chemistry 31, 33, 35. Recommended: Biological Sciences 31. 3 units, Win (Matin, Staff)

198A-F. Undergraduate Directed Reading—Prerequisite: consent of instructor. 15 units maximum, any quarter (Staff)

199. Undergraduate Research—Individual study or research in microbiology by arrangement with a faculty member. Possible fields: microbial molecular biology and physiology, microbial pathogenicity, immunology, virology, and molecular parasitology. Prerequisites: appropriate backgrounds for various areas, consent of instructors. 1-15 units, any quarter (Staff)

201. Infectious Basis of Disease—(Same as Health Research and Policy 201.) Introduction to the spectrum of human illness induced by viruses, bacteria, fungi, and medical parasites, including protozoans and helminths. Classification, epidemiology, transmission, pathogenesis, diagnosis, treatment, control, vaccination, and other preventative measures. Emphasis is on syndromic approach to disease. Lectures, demonstrations, lab sessions, and small group evaluation of clinical correlates. Use of interactive multimedia instructional program, Microbe. Labs, CPCs. Prerequisite: medical student status or consent of instructor. 9 units, Spr (Siegel, Basch)

203. Biological Stress Response—Informal seminar: microbial stress response and the mechanisms of microbial resistance. Topics: the mechanisms of the emerging resistance of bacteria to antibiotics, and the tumor multidrug resistance pumps, physiology and structural biology of molecular chaperones, and the role of stress proteins in immune response and the pathogenic process. Enrollment limited. Prerequisites: Biology Core, upper-division course in molecular biology/genetics of biochemistry. 3 units (Matin, Staff) alternate years, not given 1998-99

208. Topics in Virology—In-depth discussion of current literature in a topical area of the molecular biology of viruses. Student participation in presentations required. May be taken repeatedly. Prerequisite: 210. 1 unit, Spr (Mocarski)

210. Pathogenesis of Bacteria, Viruses, and Eukaryotic Parasites—For graduate, medical, and advanced undergraduate students. Emphasis is on understanding the molecular mechanisms by which microorganisms invade animal and human hosts, express their genomes, interact with macromolecular pathways in the infected host, and induce disease. Problem sets and recent literature pertaining to microbial pathogenesis. Prerequisite: understand-
ing of biochemistry and molecular biology.

4 units, Win (Sarnow, Boothroyd, Haldar, Kirkegaard, Mocarski, Relman)

211,212. Advanced Immunology—(Same as Immunology 201, 202.) For graduate and advanced undergraduate students. Lecture/discussion featuring current problems in immunology. Topics: genetics and structure/function relationships of antibodies, T-cell receptors, MHC antigens; accessory molecules; lymphocyte differentiation and activation; cellular regulation of immune responses; autoimmunity and other problems in clinical immunology. Prerequisites: biochemistry, basic immunology, consent of instructor (for undergraduates).

211. 3 units, Win (Chien, Staff)
212. Prerequisite: 211.
3 units, Spr (Staff)

215. Principles of Biological Technologies—(Same as Immunology 215.) Required of first-year graduate students in Microbiology and Immunology. The principles underlying commonly utilized technical procedures in biological research. Lectures on gel electrophoresis, nucleic acid hybridization, protein purification and stabilization, light microscopy and computer search algorithms for protein and nucleic acid databases. Prerequisites: biochemistry, organic chemistry, and physics.

2 units, Aut (Davis)

218. Introduction to Immunology and Host-Parasite Interaction—Introduction to medical microbiology, infectious disease, host defense, and immunology which integrates the basic concepts represented by these disciplines. Two lecture hours and one small group problem/discussion session weekly. Prepares students for more advanced courses in infectious diseases and immunology (219 and 220).

3 units, Spr (Mocarski, Staff)

8 units, Aut (Siegel)

2 units, Win (Staff)

299. Directed Reading—Prerequisite: consent of instructor.
18 units maximum, any quarter (Staff)

399. Graduate Research—Students who have satisfactorily completed the necessary foundation courses may elect research work in general bacteriology, bacterial physiology and ecology, bacterial genetics, microbial pathogenicity, immunology, parasitology, and virology.
18 units maximum, any quarter (Staff)
Students may be funded by their advisers' research grants, by future training grants, by departmental funds, or by extramural funds. Students are encouraged to obtain funding from outside sources (for example, NIH, NSF, Hughes, and so on).

**FINANCIAL AID**

Students may be funded by their advisers' research grants, by future training grants, by departmental funds, or by extramural funds. Students are encouraged to obtain funding from outside sources (for example, NIH, NSF, Hughes, and so on).

**COURSES**

Course work and lab instruction in the Department of Molecular and Cellular Physiology conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

199. Undergraduate Research—Investigation sponsored by individual faculty members, available to undergraduates, hours and units arranged. Fields of research open to students are decided in consultation with sponsoring faculty members.

any quarter (Staff)

200. Physiology: Cardiovascular—Offered jointly with the Department of Medicine. Lectures, small group instruction, clinical presentations, and lab demonstrations of normal and disordered human cardiovascular physiology. Prerequisite: understanding of general biochemistry.

6 units, Spr (Schwarz)

201. Physiology: Endocrine—Offered jointly with the Department of Medicine. Lectures, clinical presentations, and demonstrations on normal and disordered function in the endocrine system. Prerequisite: understanding of general biochemistry.

4 units, Win (Hoffman, Scheller)

202, 203, 204. Physiology: 202-Gastrointestinal; 203-Renal; 204-Respiratory—Offered jointly with the Department of Medicine. Lectures, clinical presentations, and demonstrations on normal and disordered function in the respiratory, renal, fluid and electrolyte, and acid-base systems. Prerequisite: understanding of general biochemistry.

6 units, Au (202, 1 unit; 203, 3 units; 204, 2 units) (Gastrointestinal: Lowe; Renal: Meyer; Respiratory: Raffin)

206. Pathophysiology—Offered jointly with the Department of Medicine. Physiology of disease, emphasizing clinical situations where two or more organ systems come together at the molecular, cellular, and organ level. The physiology of individual organ systems and the genetics and physiology of diseases such as cystic fibrosis, muscular dystrophy, and hypertension.

2 units, Win (Tsien)

210. Principles of Cell Physiology—Open to graduate, medical and advanced undergraduate students (with consent of instructor). Required for all MCP graduate students. Examines the basic biophysical principles that govern cell physiology and applies these principles to aid in understanding a wide range of physiological processes. Energy transduction, diffusion, membrane properties, and electrical potentials and gradients are related to current problems in ionic and electrical signaling, solute and solvent transport and cellular homeostasis. Lecture/discussions introduce basic concepts; students use

**Advisers and Advisory Committees**—A graduate advisory committee, currently Professors Madison, Schwarz, and Smith, advises students during the period before the formation of their qualifying committees.

**Qualifying Examination**—At the end of the second year in residence as a graduate student, each Ph.D. candidate presents a written thesis proposal to be defended at an oral comprehensive examination. General knowledge of relevant physiology is also tested orally at a separate examination. The examinations may be taken only after all course work has been completed by the required standard. Students undertake individual research studies as early as possible after consultation with their preceptor. Upon passing this exam, the student is advanced to candidacy for the Ph.D.

**Dissertation and University Oral Examination**—The results of independent, original work by the students are presented in a dissertation. The oral examination is largely a defense of the dissertation.

**FINANCIAL AID**

Students may be funded by their advisers' research grants, by future training grants, by departmental funds, or by extramural funds. Students are encouraged to obtain funding from outside sources (for example, NIH, NSF, Hughes, and so on).
these principles to solve specific physiological problems.

4 units, Spr (Aldrich, Lewis)

213. Special Topics in Molecular and Cellular Physiology—Seminar of guided reading/discussion in introductory and advanced physiological topics agreed on by an individual instructor and interested students. Prerequisite: consent of instructor.

(Staff)

215. Synaptic Transmission—Primarily for graduate students with an interest in synaptic function; interested medical students and advanced undergraduates may enroll. The anatomical, physiological, and biochemical basis of synaptic function in the peripheral and central nervous system. Lectures by the faculty and intensive discussions of relevant research papers.

5 units, Aut (Smith, Schwarz, Madison) alternate years, not given 1998-99

216. Ion Channels and Membrane Physiology— (Same as Neurobiology 216.) For students with some background in neurobiology who wish to learn the basic mechanisms of signaling in nerve cells. Reading/discussion of original research papers, emphasizing concepts, quantitative analysis of experimental results, and critical evaluation of evidence. Topics: gating mechanisms in voltage sensitive and chemosensitive ion channels and ionic mechanisms in sensory transduction. Student presentations and small group discussions.

3 units (Aldrich, Baylor), alternate years, given 1998-99

218. Transmembrane Signal Transduction—The molecular mechanisms of signal transduction for a variety of structurally and functionally different plasma membrane receptors. Topics: the structure of receptors and the interaction of the receptor protein with the lipid bilayer; ligand binding and ligand mediated changes in receptor structure; and cytosolic, cytoskeletal, and membrane proteins that interact with receptors. Seminar/discussion emphasizes recent research developments and examines the value of various experimental approaches for the study of receptors.

2 units (Kobilka)

alternate years, not given 1998-99

221. Cell Biology of Physiological Processes— (Same as Biological Sciences 214.) The basic mechanisms of membrane and cellular biogenesis in relation to physiological processes. Emphasis is on regulatory and signaling mechanisms involved in coordinating complex cellular phenomena such as cellular organization, function, and differentiation. Topics: cellular compartmentalization, transport and trafficking of macromolecules, organelle biogenesis, cell division, motility and adhesion, and multicellularity. Prerequisites: Biology core, Biochemistry 201.

5 units, Win (Kopito, W. Nelson)

222. Imaging: Biological Light Microscopy— (Same as Biological Sciences 152.) Survey of instruments which use light and other radiation for analysis of cells in biological and medical research. Topics: basic light microscopy through confocal fluorescence and video/digital image processing. Lectures on physical principles; involves partial assembly and extensive use of lab instruments. Lab. Prerequisites: some college physics, Biology core.

3 units, Spr (Green, S. Smith)

299. Directed Reading—Prerequisite: consent of instructor.
any quarter (Staff)

399. Advanced Research—Investigation sponsored by individual faculty members undertaken by interested, qualified medical or graduate students. Research fields include endocrinology, neuroendocrinology, and topics in molecular and cellular physiology.

any quarter (Staff)

MOLECULAR PHARMACOLOGY

Emeriti: (Professors) Robert H. Dreisbach, Avram Goldstein, Dora B. Goldstein
Chair: Helen M. Blau
Professors: Terrence Blaschke (jointly with Medicine), Helen M. Blau, Tag E. Mansour, Richard A. Roth, James P. Whitlock, Jr.
Associate Professors: Phyllis Gardner (jointly with Medicine), Daria Mochly-Rosen
Assistant Professors: James E. Ferrell, Jr., Garry P. Nolan
Courtesy Professor: Kenneth Melmon
Courtesy Assistant Professor: Leslie Lenert
Consulting Professors: Gordon Ringold, Alejandro Zaffaroni

GRADUATE PROGRAMS

The Department of Molecular Pharmacology offers interdisciplinary training in molecular and cellular biology, genetics, and biochemistry in preparing students for independent careers in biomedical science. Research and training in the department focuses on the mechanisms by which hormones, drugs, and toxic compounds alter cell function. At the heart of these issues lies the analysis of cell signaling and gene expression.

The program leading to the Ph.D. degree includes formal and informal study in pharmacology, biochemistry, genetics, physiology, neuroscience, and computer science. First-year students spend one quarter in each of three different laboratories, working closely with other graduate students, a professor, and postdoctoral fellows on various research projects. During the fourth quarter, the student chooses a faculty mentor with
whom to undertake thesis research, based on available positions and the student’s interest. During or before the eighth quarter of study, students must pass a qualifying exam which consists of an oral exam on general knowledge and a defense of a research proposal. Course requirements are fulfilled during the first two years of study; the later years of the four- to six-year program are devoted to full-time dissertation research. Close tutorial contact between students and faculty is stressed throughout the program.

Students in the Ph.D. program may apply for an M.S. degree, having satisfactorily completed the course and laboratory requirements of the first two years. The degree also requires a written thesis based on literature or laboratory research. Postdoctoral research training is available to graduates having the Ph.D. or M.D. degree. Research opportunities also exist for medical students and a limited number of undergraduate students. The limited size of the labs in the department allows for close tutorial contact between students, postdoctoral fellows, and faculty.

The department presents two basic courses in medical pharmacology (201 and 202) and advanced courses open to qualified medical and other graduate students. Consult the Time Schedule for additional advanced courses.

COURSES

Course work and lab instruction in the Department of Molecular Pharmacology conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

BASIC

201 and 202 provide a broad exposure to the principles of pharmacology and the properties of the major drug groups.

201. Pharmacology—Topics: receptors; pharmacokinetics; and autonomic, CNS, and cardiovascular pharmacology. Emphasis is on the mechanisms of drug action in humans. Prerequisite: biochemistry.
5 units, Aut (Staff)

5 units, Win (Staff)

ADVANCED

Open to all University students; instructor’s consent required prior to registration. These courses require a good knowledge of physiology and biochemistry and sometimes of microbiology or genetics. Students should consult with the instructor about the adequacy of their preparation.

210. Cell Signaling—The molecular mechanisms through which cells receive and respond to external signals, taught out of the primary literature. Topics: biochemical, cell biological, genetic, and pharmaceutical approaches to specific signaling problems. Complements those areas of cell signaling covered by 221/Biological Sciences 214, and Neurobiology 230, focusing on protein phosphorylation and cell cycle control. Prerequisites: Biochemistry 201 or 202. Recommended: 221/Biology 214.
4 units (Ferrell, Staff)
alternate years, given 1998-99

225. Frontiers of Pharmacology: Principles of Action of Chemotherapeutic Agents against Infection—Chemistry and biotechnology students with consent of instructor; auditors welcome. Emphasis is on the selective effect of chemotherapeutic agents against bacteria, viruses, parasitic protozoa, helminths, and cancer; and how advances in the study of the biochemistry and molecular biology of invading organisms and cancer cells revolutionized our understanding of the chemotherapeutic effects of these agents. Topics: major metabolic differences between invading organisms and the mammalian host, targets that are unique to these organisms or are significantly different from their homologues in the host, neurobiology of parasitic helminths and selective effect of chemical agents against parasite neuromuscular functions, resistant strategies developed by these organisms and cancer cells to evade the effect of chemotherapeutic agents. Lectures, discussions, readings in current literature. Prerequisite: Biochemistry 200 or Biology 31 or equivalent.
2 units, Win (Mansour)

231. Gene Therapy—Cell mediated gene therapy as a novel form of drug delivery. Vectors, cell types, and relevant genetic and acquired diseases are discussed in a series of lectures, and student and guest presentations. Prerequisites: biochemistry and molecular biology.
2 units (Blau) alternate years

240. Drug Discovery—The scientific principles and technologies involved in making the transition from a basic biological observation to the creation of a new drug, with emphasis on molecular and genetic issues.
4 units (Mochly-Rosen, Staff)
alternate years, not given 1998-99

270. Research Seminar—Weekly seminars on current research in pharmacology. Seminars are reviewed and discussed in a separate conference with a member of the faculty.
2 units, Aut Win, Spr (Staff)

280. Tutorial Program—Primarily for graduate students in pharmacology. Guided readings in the literature of any area of pharmacology. A critical review paper may be required.
any quarter (Staff)
299. Directed Reading
   any quarter (Staff)

399. Research
   any quarter (Staff)

NEUROBIOLOGY

Chair: Howard Schulman
Professors: Denis A. Baylor, Eric I. Knudsen, Uel J. McMahan, William T. Newsome, Howard Schulman, Eric M. Shooter, Lubert Stryer
Associate Professor: Barbara Barres

GRADUATE PROGRAM

Graduate students in the Department of Neurobiology obtain the Ph.D. degree through the interdepartmental Neurosciences Ph.D. program. Accepted students receive funding for tuition and a living stipend. Applicants should familiarize themselves with the research interests of the faculty and, if possible, indicate their preference on the application form which is submitted directly to the Neurosciences Program.

Medical students also are encouraged to enroll in the Ph.D. program. The requirements of the Ph.D. program are fitted to the individual interests and time schedules of the student. Postdoctoral training is available to graduates holding Ph.D. or M.D. degrees, and further information is obtained directly from the faculty member concerned.

Research interests of the department include: mechanisms of visual transduction and information transmission in vertebrate retina; structure, function, and development of auditory and visual systems; integrative mechanisms and regeneration in the central and peripheral nervous system; mechanisms of ion channel function; and neuronal growth and differentiation.

COURSES

Course work and lab instruction in the Department of Neurobiology conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

The department offers a one-quarter course (Neurobiology 200) on the structure and function of the nervous system, which is open to medical and graduate students, and advanced undergraduates. Advanced courses are open to students who have completed the basic course.

199. Directed Reading (Undergraduate)—Pre-requisite: consent of instructor.
   1-18 units, any quarter (Staff)

200. The Nervous System—Introduction to the structure and function of the nervous system, including neuroanatomy, neurophysiology, and neurochemistry. Topics range from the properties of neurons to the mechanisms and organization underlying higher functions. Coherent framework prepares for general work in neurology, neuropathology, clinical medicine, and for more advanced work in neurobiology. Lecture and lab components must be taken together.
   9 units, Win (Barres, Baylor, Knudsen, McMahan, Newsome, Schulman, Shooter, Stryer)

211. Molecular Basis of Learning and Memory—Modulation of signal transduction in the nervous system. Model systems used in the study of neuronal plasticity include Aplysia, Drosophila, and mammalian hippocampus. Lectures/discussion. Prerequisites: Biochemistry 200, Biological Sciences 254, or equivalent.
   4 units, Spr (Schulman)
   alternate years, not given 1998-99

216. Ion Channels and Membrane Physiology—(Same as Molecular and Cellular Physiology 216.)
   For students with some background in neurobiology who wish to learn basic mechanisms of signaling in nerve cells. Reading/discussion of original research papers, emphasizing concepts, quantitative analysis of experimental results, and critical evaluation of evidence. Topics: gating mechanisms in voltage sensitive and chemosensitive ion channels and ionic mechanisms in sensory transduction. Student presentations and small group discussions.
   3 units (Aldrich, Baylor)
   alternate years, given 1998-99

217. Synaptogenesis and Synaptogen—Seminar evaluating current views on the sequence of steps and mechanisms involved in synapse formation. Emphasis is on the neuromuscular synapse; its development in the embryo and its regeneration in the adult. Students read original articles, write summaries, and present them for discussion.
   4 units (McMahan)
   alternate years, given 1998-99

218. Neural Basis of Behavior—Advanced seminar exploring the principles of information processing by the central nervous system of vertebrates, and the relationship of functional properties of neural systems with perception and behavior. Emphasis is on the visual and auditory systems. Study of original papers, directed group discussions, and student presentations. Prerequisite: 200 or consent of instructor.
   4 units (Knudsen, Newsome)
   alternate years, given 1998-99

230. Signal Transduction Mechanisms—Molecular mechanisms of transduction of sensory and hormonal stimuli by prokaryotes and eukaryotes. Topics: bacterial chemotaxis and phototaxis; vision in invertebrates and vertebrates; olfaction; and hormonal actions mediated by G-proteins, e.g., adenylate cyclase cascade and the phosphoinositide cas-
cade; molecular evolution of transducing proteins. The structure and interplay of receptors, enzymes, and ion channels mediating these processes. Experimental approaches include gene cloning and site-specific mutagenesis, isolation and reconstitution of functional transducing assemblies, and patch clamping and other electrophysiological methods. Emphasis is on recurring motifs of excitation and adaptation, and transduction and their evolution.

4 units (Stryer) alternate years, given 1998-99

299. Directed Reading—Prerequisite: consent of instructor.
1-18 units, any quarter (Staff)

300. Professional Development and Integrity in Neuroscience—Required of Neurosciences Ph.D. students every quarter. Develops professional skills in critical assessment and oral presentation of findings from current neuroscience literature in visual presentation of quantitative data and writing research grants. The role of animals in lab research, fraud in science, responsibility of authors and reviewers, science in a multicultural environment, and the relationship between student and mentor. Student and faculty presentations and discussions.

2 units, Aut, Win, Spr (Schulman)

399. Individual Research—Prerequisite: consent of instructor.
1-18 units, any quarter (Staff)

NEUROSCIENCES PROGRAM

Director: Howard Schulman (Professor of Neurobiology)

Participating Faculty:
Anesthesia: Rona Giffard (Associate Professor), Joan E. Kendig (Professor of Biology in Anesthesia), M. Bruce MacIver (Assistant Professor, Research), Mervyn Maze (Professor)
Biological Sciences: William F. Gilly (Associate Professor), H. Craig Heller (Professor), Ron Kopito (Professor), Liqun Luo (Assistant Professor), Susan McConnell (Associate Professor), Robert M. Sapolsky (Professor), Stuart Thompson (Professor)
Developmental Biology: Matthew P. Scott (Professor)
Genetics: David R. Cox (Professor)
Molecular and Cellular Physiology: Richard Aldrich (Professor), Brian Kobilka (Associate Professor), Richard S. Lewis (Associate Professor), V. Daniel Madison (Associate Professor), Richard H. Scheller (Professor), Thomas Schwarz (Associate Professor), Stephen Smith (Professor), Richard Tsien (Professor)

Molecular Pharmacology: Helen Blau (Professor), Daria Mochly-Rosen (Associate Professor)

Neurobiology: Denis A. Baylor (Professor), Barbara Barres (Associate Professor), Eric I. Knudsen (Professor), U. J. McMahen (Professor), William T. Newsome (Professor), Howard Schulman (Professor), Eric M. Shooter (Professor), Lubert Stryer (Professor)

Neurology and Neurological Sciences: John A. Huguenard (Assistant Professor, Research), David A. Prince (Professor), Marion E. Smith (Professor, Research), Lawrence Steinman (Professor)

Neurosurgery: Gary K. Steinberg (Professor)

Pathology: Lawrence F. Eng (Professor, Research)

Psychiatry and Behavioral Sciences: William C. Dement (Professor), Judith Ford (Associate Professor, Research), Edith Sullivan (Associate Professor, Research), Terrence A. Ketter (Associate Professor)

Psychology: Russell D. Fernald (Professor), John Gabrieli (Assistant Professor), David Heeger (Assistant Professor, Teaching), David E. Rumelhart (Professor), Brian Wandell (Professor), Jeffrey J. Wine (Professor)

GRADUATE PROGRAM

DOCTOR OF PHILOSOPHY

The interdepartmental Neurosciences Program offers instruction and research opportunities leading to a Ph.D. in Neurosciences. The requirements for a Ph.D. degree follow those of the University and in addition are tailored to fit the background and interests of the student. Accepted students receive an award covering tuition, basic health plan, and a living stipend. Qualified applicants should, where possible, apply for the predoctoral fellowships in open competition, especially those from the National Science Foundation and the Howard Hughes Medical Institute. December 15 is the deadline for receipt in the Neurosciences Program Office of applications with all supporting material.

Applicants should familiarize themselves with the research interests of the faculty and indicate their preferences clearly on the application form. Since students enter with differing backgrounds and the labs in which they may elect to work cover several different disciplines, the specific program for each student is developed individually with an advisory committee. All students are required to complete the basic courses in neurobiology (Neurobiology 200 or its equivalent). Students are also required to take at least five advanced neu-
roscience courses. At least one course must be taken in five of the following six categories: Clinical Neurosciences, Computational Neuroscience, Developmental Neuroscience, Integrative and Behavioral Neurosciences, Membrane Excitability, and Neuronal Communication.

Students usually rotate through several labs during their first year, although they may choose to begin thesis research on entry. After the first rotation, students may rotate both within and outside the Neurosciences Program. Required course work should be completed by the end of the second year. Passing of a comprehensive oral preliminary examination given by the student's advisory committee is required for admission to Ph.D. candidacy. This examination is usually taken by the end of the second year. The student is required to present a Ph.D. dissertation which is the result of independent investigation contributing to knowledge in an area of neuroscience and to defend his or her dissertation in a University oral examination, which includes a public seminar.

Medical students may participate in this program provided they meet the prerequisites and satisfy all the requirements of the graduate program as listed above. The timing of the program may be adjusted to fit their special circumstances.

**COURSES**

Course work and lab instruction in the Neurosciences Program conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

The course selections of individual departments participating in the Neurosciences Program should also be consulted for complete offerings.

399. Research—Prerequisite: consent of instructor.
1-18 units, any quarter (Staff)

**BIOLICAL SCIENCES**

158/258. Developmental Neurobiology—(Graduate students register for 258.)
4 units (McConnell) alternate years, given 1998-99

358. Seminar in Developmental Neurobiology
1 unit (McConnell) not given 1997-98

**MOLECULAR AND CELLULAR PHYSIOLOGY**

215. Synaptic Transmission
5 units, Aut (Smith, Schwarz, Madison) alternate years, not given 1998-99

216. Ion Channels and Membrane Physiology—(Same as Neurobiology 216.)
3 units (Aldrich, Baylor) alternate years, given 1998-99

**NEUROBIOLOGY**

200. The Nervous System
9 units, Win (Barres, Baylor, Knudsen, McMahan, Newsome, Schulman, Shooter, Stryer)

211. Molecular Basis of Learning and Memory
4 units, Spr Schulman alternate years, not given 1998-99

216. Ion Channels and Membrane Physiology—(Same as Molecular and Cellular Physiology 216.)
3 units (Aldrich, Baylor) alternate years, given 1998-99

217. Synaptogenesis and Synaptogen
4 units, Aut (McMahan) alternate years, not given 1998-99

218. Neural Basis of Behavior
4 units (Knudsen, Newsome) alternate years, given 1998-99

230. Signal Transduction Mechanisms
4 units (Stryer) alternate years, given 1998-99

300. Professional Development and Integrity in Neuroscience
2 units, Aut, Win, Spr (Schulman)

**NEUROLOGY AND NEUROLOGICAL SCIENCES**

205. Clinical Neuroscience—Case demonstrations of selected disorders, discussion of the pathophysiological basis of the disorder, presentation of the basic principles underlying the modern diagnostic and therapeutic management, and a discussion of recent research advances for each disease entity.
2 units, Win (Huguenard)

**PSYCHOLOGY**

206. Behavioral Neuroscience
1-3 units (Wandell, Wine) alternate years, given 1998-99

276. Computational Neuroscience
1-3 units, Aut (Heeger, Rumelhart) alternate years, not given 1998-99

**PATHOLOGY**

Emeriti: (Professors) Margaret E. Billingham, Ronald F. Dorfman, Lysia K. Forno, David Glick; (Clinical Assistant Professor) Charles T. Uyeda
Chair: Klaus G. Bensch
esa S. F. Wang, Roger A. Warnke, Irving L. Weissman

**Associate Professors:** Gerald J. Berry, Eugene C. Butcher, Michael L. Cleary, P. Joanne Cornbleet, Steven K. H. Foung, Joseph S. Lipsick, Kent W. Nowels, Donald P. Regula, Robert V. Rouse, Raymond A. Sobel, Alan Ting

**Assistant Professors:** Stephen C. Blacklow, Athena M. Cherry, R. Eric Davis, Susan A. Gale, Sharon M. Geaghan, Peter Jackson, Sabine Kohler, Teri A. Longacre, Sara A. Michie, James L. Zehnder

**Professor (Research):** Lawrence F. Eng

**Professors (Clinical):** Dikran S. Horoupian, Jon C. Kosek

**Acting Assistant Professors:** Robert F. Hevner, Keith A. Wharton

**Clinical Professors:** James L. Bennington, Jerome S. Burke, Stephen S. Chen, John T. Diffferding, Seth L. Haber, Maie E. Herrick, Paul L. Herrmann, John E. McNeal, Mahendra Ranchoed

**Clinical Associate Professors:** Robert W. R. Archibald, Barbara M. Egbert, Steven Levine, Charles M. Lombard

**Clinical Assistant Professors:** Stephen Bell, Robert M. Cardelli, James E. Meeker, Thomas W. Rogers, Jon C. Ross, William W. Ruehl, Joshua Sickel, Sharon H. Van Meter

**Staff Physicians and Clinical Instructors:** Gregory Baetge, David B. Bingham, Delia Menozzi, Christine Ruemmler-Fisch

**Clinical Instructor:** Jorge Rodriguez-Soto

**Clinical Lecturer:** Glen B. Haydon

**PROGRAMS OF STUDY**

The Department of Pathology offers a sequence of basic courses in general and special pathology, including neuropathology, which is open to medical students only. Interested and qualified graduate students may petition the course director to audit the lecture portion of these courses. In addition, there are a number of advanced courses in selected aspects of pathology. The department does not offer advanced degrees in pathology, but qualified graduate students who are admitted to the Biophysics Program, the Cancer Biology Program, or other interdepartmental programs may elect to pursue their thesis requirements in the research laboratories of the Department of Pathology. The discipline of pathology has traditionally served as a bridge between the preclinical and clinical sciences and is concerned with the application of advances in the basic biological sciences, both to the diagnosis of disease in man and to the elucidation of the mechanisms of normal molecular, cellular, and organ structure and function that manifest themselves in clinical disease. Accordingly, the department's research interests encompass a broad range that extends from fundamental molecular biology to clinical-pathological correlations, with a primary emphasis on experimental oncology.

At present, investigation in the department includes basic studies in different areas utilizing molecular biological, biochemical, and cell biological techniques: DNA replication in yeast and cultured eukaryotic cells, cell cycle control in animal cells and yeast, identification and patho-genetic role of chromosomal aberrations in human malignancies and mechanisms of activation of oncogenes in human and animal cells, lymphocyte and neutrophil-interactions with endothelial cells, cell type specification and signal transduction pathways leading to specific gene expression; cytoskeletal architecture, cell-matrix interaction, developmental biology of hematopoietic stem cells and thymus, regulation of the immune system, and mechanisms of immune and other responses in the central nervous system. In addition, a variety of studies focus on the development of novel diagnostic and immunotherapeutic treatment modalities and techniques for solid tumors, lymphomas, HIV, and genetic diseases. Research training in all of these areas is available for qualified medical and graduate students by individual arrangement with the appropriate faculty member. A summary of the research interests of the department faculty is available on request.

**COURSES**

Course work and lab instruction in the Department of Pathology conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

**211,212. Advanced Immunology**—(Enroll in Immunology 201, 202.)

- **211. 3 units, Win (Chien, Staff)**
- **212. 3 units, Spr (Staff)**

**215. Molecular Mechanisms of Disease**—Provides graduate students in the basic sciences with an exposure to current research topics in human disease. Each week, one scientist from academia or industry presents a seminar on the pathogenesis of a particular disease, with an emphasis on molecular approaches, followed by a discussion. A review article and one or two research papers from the current literature are assigned prior to each meeting.

1 unit, Win (Lipsick, Staff)

**230A,B,C. General and Special Pathology**—Three-quarter introduction to principles in general pathology and a detailed pathology of human disease based on disordered structure and function of individual organ systems (special pathology). Lecture and lab discussion groups. Course director: Regula.

- **230A. General and Special Pathology**
  - 6 units, Spr (Regula, Rouse, Staff)
- **230B. Special Pathology**
  - 6 units, Aut (Regula, Lombard, Staff)
230C. Special Pathology
6 units, Win (Regula, Hendrickson, Horoupian, Staff)

245. Practical Course of Laboratory Techniques in Molecular Biology—Prepares medical students with the practical skills to perform current protocols in molecular biology relevant to the most common medical scholarly settings. Instructors introduce a selected technique or techniques for 20-25 minutes. Students form small groups and perform the techniques discussed under the supervision of the instructors, and design experiments (e.g., use of appropriate controls) involving these techniques. Syllabus is in the form of a laboratory manual so that students may use the protocols in future laboratory research settings. Regular attendance earns one unit of +/-NC credit. Enrollment limited to 20 medical students including a limited number of undergraduate students, space permitting.

1 unit, Win (Hoppe, Frutkin, Furthmayr)

290. Research in Experimental Neuropathology—Introduction to research methods in experimental neuropathology for students interested in a long-term project in this area. Participation in research under the close supervision of a staff member in neuropathology. Facilities available include electron microscopy, tissue culture, neurochemistry and immunocytochemistry with antibody and molecular probes. Prerequisite: consent of instructor.

1-18 units, Spr (Eng, Forno)

292. DNA Repair and Mutagenesis—(Enroll in Biology 205.)
3 units, Spr (Hanawalt)

299. Directed Reading—Prerequisite: consent of faculty member.
1-18 units, any quarter (Staff)

399. Research—Department faculty are involved in active research programs at the Stanford Medical Center. Students interested in research at the molecular, cellular, and clinical-pathologic levels are encouraged to seek out faculty advisers. The department is equipped for modern research and maintains an active and vigorous postdoctoral research training program. Prerequisite: consent of the instructor.
1-18 units, any quarter (Staff)

**RADIATION ONCOLOGY**

Emeriti: Malcolm A. Bagshaw, Peter Fessenden, George M. Hahn, Robert F. Kallman, Clarence J. Karzmark, Kendric Smith

Chair: Richard T. Hoppe


Associate Professors: Susan J. Knox

Assistant Professors: Joseph C. Poen, Melanie C. Smitt, David J. Tate, Amato J. Giaccia

Assistant Professors (Research): Amato J. Giaccia, Cordula Kirchgessner, Chang-ming Ma, Lei Xing

Acting Associate Professor: Gikas Mageras
Acting Assistant Professor: Kenneth Forster

**PROGRAMS OF STUDY**

Radiation Oncology is a discipline focused around the use of radiation for both cancer therapy and research. The fundamental and applied research within the department reflects this spectrum in radiation therapy and clinical oncology, and in radiation and tumor biology.

The department does not offer degrees; however, its faculty teach a variety of courses open to medical students, graduate students, and undergraduates. The department also accepts students in other curricula as advisees for study and research. Graduate students in the Biophysics Program and in the Cancer Biology Program may perform their thesis research in the department. Undergraduate students may also arrange individual research projects under the supervision of the faculty.

At the present time, the major areas of basic research investigation in the department include: DNA repair in mammalian cells after ionizing irradiation; studies of the mechanism of tumor hypoxia in animal tumors; development of new anti-cancer drugs to exploit tumor hypoxia; cytogenetic and molecular methods of predicting the sensitivity of individual tumors to cancer therapy; radiolabeled monoclonal antibodies for cancer detection and treatment; studies of oxygen levels in human tumors using polarographic electrodes; clinical trials of a new hypoxic cytotoxic agent (tirapazamine); and studies of late effects of cancer therapy.

**COURSES**

Course work and lab instruction in the Department of Radiation Oncology conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

The following are open to undergraduate and postgraduate students.

101. Selected Readings in Radiation Biology
Aut, Win, Spr (Staff)

202. The Basic Science of Radiation Therapy—Primarily for residents or fellows in the Radiation Therapy division training program; open to medical or graduate students. Focus is on the basic biological processes underlying the treatment of malignant disease by radiation. Prerequisites: some familiarity with cell biology and physiology, and consent of instructor.

1 unit, Aut, Win, Spr (Brown)
3 units (Staff)
alternate years, not given 1998-99

299. Directed Reading
any quarter (Staff)

399. Research
any quarter (Staff)

RADIOLOGY

Emeriti: (Professors) Herbert L. Abrams, Henry H. Jones, Albert Macovski, Frederic N. Silverman, Leslie M. Zatz
Chair: Gary M. Glazer
Associate Professors: Richard A. Barth, King C. P. Li, Robert E. Mindelzun, Michael E. Moseley, Sandy A. Napel, Matilde Nino-Murcia, George Segall
Assistant Professors: Christopher F. Beaulieu, A. Gabrielle Bergman, Robyn L. Birdwell, Francis Blankenberg, Michael Dake, Ann N. C. Leung, Michael Marks, Alexander Norbash, Eric Olcott, Geoffrey D. Rubin, Charles P. Semba, Daniel M. Spielman
Courtesy Associate Professor: Dwight G. Nishimura

The Department of Radiology does not offer degrees; however, its faculty teach a variety of courses open to medical students, graduate students, and undergraduates. The department also accepts students in other curricula as advisees for study and research. Undergraduate students may also arrange individual research projects under the supervision of the department’s faculty.

This discipline focuses on the use of radiation, ultrasound, and magnetic resonance as diagnostic, therapeutic, and research tools. The fundamental and applied research within the department reflects this broad spectrum as it relates to anatomy, pathology, physiology, and interventional procedures. Original research and development of new clinical applications in medical imaging is supported within the Radiological Sciences Laboratory.

Courses open to undergraduate and postgraduate students are listed below.

COURSES

101. Selected Readings in Radiology Research
Aut, Win, Spr (Staff)

208. Experimental Nuclear Medicine—Computer applications in medicine, particularly use of radioisotopes as tracers. Recommended: some knowledge of physiology and calculus.
Spr (Strauss)

237. Medical and Societal Aspects of Modern War and the Arms Race—One-day course covers nuclear weapons and the nuclear arsenal; chemical and biological weapons; medical consequences including radiation, blast and burn injuries, and psychological effects; the economic and societal effects of the arms race.
1 unit (Jones, Staff)

299. Research
any quarter (Staff)

STRUCTURAL BIOLOGY

Chair: Michael Levitt
Associate Chair: Peter Parham
Professors: Roger D. Kornberg, Michael Levitt, David B. McKay
Associate Professor: Joseph D. Puglisi
Assistant Professor: William Weis
Associate Professor (Teaching): Patricia Cross

The department offers opportunities for course work and research in cell biology. Courses fall in two categories: (1) a series of one-quarter courses that treat special topics of current interest in cell biology at an advanced level; and (2) Structure of Cells and Tissues, a one-quarter course tailored to the needs of medical students that includes both lectures on structure-function relationships of mammalian cells and tissues and a lab on medical histology.

The emphasis of research in the department is on understanding fundamental cellular processes in terms of the structure and function of organelles and molecular assemblies. Techniques used include standard methods of biochemistry, genetic engineering, and cell culture, as well as image processing and three-dimensional reconstruction from electron micrographs, x-ray and electron diffraction, fluorescence microscopy, nanosecond fluorescence spectroscopy, and microinjection of cells and nuclei. The department owns and operates a computing center equipped with advanced time-sharing and color graphics systems for data analysis and molecular modeling.

The graduate program in Structural Biology leads to the Ph.D. degree. The department also participates in the Medical Scientists Training Program in which individuals are candidates for both the Ph.D. and M.D. degrees.

The graduate program is intended to prepare students for careers as independent investigators.
in cell and molecular biology. The principal requirement of a Ph.D. degree is the completion of research constituting an original and significant contribution to the advancement of knowledge. In addition, students are required to enroll in the series of special topics courses taught by the faculty of the department. Finally, students gain teaching experience by assisting in the one-quarter courses offered by all faculty in the department.

Applicants to the program should have a bachelor's degree and should have completed at least a year of course work in mathematics, physics, organic chemistry, physical chemistry, and biology. Application forms must be received by the department before January 1 for notification by April 15. Application to the National Science Foundation for fellowship support is also encouraged. Remission of fees and a personal stipend are available to graduate students in the department. Prospective applicants should write to the Department of Structural Biology for further information.

Current topics of research in the department lie in the areas of gene expression; theoretical, crystallographic, and genetic analysis of protein structure; signal transduction; and cell-cell interaction.

COURSES

Course work and lab instruction in the Department of Structural Biology conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

211. Structure of Cells and Tissues—The structural organization of tissues in relation to their function. Topics: light and electron microscopy, epithelia, muscle, connective tissue, bone and cartilage, blood, cardiovascular system, lymphoid tissue, nervous tissue, skin, endocrine, exocrine, gastrointestinal, respiratory, urinary, female and male genital systems, and the ear and eye. Three lectures, two labs, and one review session per week.

7 units, Aut (Cross, Staff)

228. Protein and Nucleic Acid Structure, Dynamics, and Engineering—The availability of three-dimensional atomic structures of proteins and nucleic acids allows interpretation of biological processes based on the physical and chemical properties of these molecules. Crystallographic studies: structural themes exemplified by local chain conformation, secondary structure, domains, families of folds, protein folding and thermodynamic stability. How these structures move is considered by combining the results of experiments with theoretical molecular dynamics simulations. Enzyme catalysis is described in these terms. These structures can be changed to engineer novel molecules from the experimental and predictive aspects; interactive computer graphics programs illustrate problems. Systems include protein-nucleic acid complexes and antibody-antigen interactions. Prerequisites: knowledge of basic biochemistry and cell biology.

3 units, Win (Levitt)

229. The Eukaryote Chromosome—Principles of chromosome structure and function. Topics: structure, dynamics, and topological forms of DNA; units and hierarchies of DNA coiling in chromosomes; centromeres, telomeres, and the basis of chromosome maintenance and sorting in mitosis; the mechanism of gene activation with regard to enhancer, promoter, and terminator sequences; basis of sequence-specific protein-DNA interaction; organization and assembly of the cell nucleus. Prerequisites: knowledge of basic biochemistry and cell biology.

3 units, Spr (Kornberg)

232. Macromolecular Structure: Diffraction Methods and Diffraction Results—General methods and notable accomplishments of x-ray crystallography and solution scattering. Methodology topics: small-angle scattering, fiber diffraction, and x-ray crystallography at a level that makes current literature in the field understandable to the non-practitioner. Protein folding patterns, enzymology, receptor-effector systems, proteins of the immune system, and membrane proteins. Prerequisite: knowledge of basic biochemistry.

3 units, Win (Weis, McKay)

237. Introduction to Biotechnology—(Same as Biochemistry 237, Biological Sciences 237, Chemical Engineering 237, Civil Engineering 237, Developmental Biology 237.) Faculty from the Departments of Biochemistry, Biological Sciences, Chemical Engineering, Chemistry, Civil Engineering, Developmental Biology, Structural Biology, and invited industrial speakers review the interrelated elements of modern biotechnology. Topics: protein structure and dynamics, protein engineering, biocatalysis, gene expression, cellular metabolism and metabolic engineering, fermentation technology, and purification of biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences or engineering.

3-5 units, Spr (Robertson)

260. Supervised Study—Research or advanced tutorial for undergraduates.

1-18 units, any quarter (Staff)

299. Directed Reading

1-18 units, any quarter (Staff)

399. Individual Research

1-18 units, any quarter (Staff)
INDEPENDENT RESEARCH LABORATORIES, CENTERS, AND INSTITUTES

Vice Provost and Dean of Research and Graduate Policy: Charles H. Kruger
Associate Dean of Research: H. Craig Heller
Associate Dean of Graduate Policy: Thomas Wasow

Independent Research Laboratories, Centers, and Institutes perform multidisciplinary research that extends beyond the scope of any one of the organized schools of the University.

The following report to the Vice Provost and Dean of Research and Graduate Policy:

Center for Economic Policy Research
Center for Materials Research
Center for the Study of Language and Information
Edward L. Ginzton Laboratory
W. W. Hansen Experimental Physics Laboratory
Institute for International Studies
Institute for Research on Women and Gender
Stanford Humanities Center

The Hoover Institution on War, Revolution and Peace and the Stanford Linear Accelerator Center report to the President and Provost. SLAC is independently operated under a contract with the Department of Energy.

Following is a description of the activities of each of these organizations including the research activities and, where applicable, courses offered.

CENTER FOR ECONOMIC POLICY RESEARCH

Director: John B. Taylor

The primary mission of the Center for Economic Policy Research (CEPR) is to encourage and support research on economic policy issues in areas such as economic growth, technology policies, environmental and telecommunication regulation, tax reform, international trade, and monetary policy. CEPR pursues four interrelated goals in support of this mission: (1) stimulating graduate student and faculty research on economic policy issues of continuing importance; (2) communicating its findings broadly; (3) building a community of scholars conducting research on policy issues; and (4) linking the policy community at Stanford with decision-makers in business, government, and academia.

CEPR is a University-wide research center, involving economists from the schools of Business, Engineering, Law, Humanities and Sciences as well as the Hoover Institution and the Institute for International Studies. Affiliated faculty and students maintain appointments in their home departments while working on CEPR projects. In addition, scholars visiting from other institutions may apply for affiliation with CEPR.

Much of the research at CEPR takes place in research center or research programs. The Center for Research on Economic Development and Policy Reform (Anne O. Krueger, Director) fosters research on the economic problems of developing economies and economies in transition as well as analyzing the political aspects of economic policy reform and historical episodes of reform. For more information about this program call (650) 725-8730.

Research programs within CEPR and their directors are Energy, Natural Resources, and the Environment Program (James L. Sweeney), the Finance Program (John B. Shoven), the High Technology Impact Program (Paul A. David), the International Economy Program (Anne O. Krueger), the Program on the Japanese Economy (Masahiko Aoki), the Macroeconomics and Monetary Policy Program (John B. Taylor), the Program in Regulatory Policy (Roger Noll), the Tax and Budget Policy Program, (John B. Shoven), and the Technology and Economic Growth Program (Timothy Bresnahan, Ralph Landau, and Nathan Rosenberg).

CEPR does not offer courses for academic credit, admit students, or award degrees. CEPR is located on the first floor of the Landau Economics Building at the corner of Serra and Galvez Streets, telephone (650) 725-1874. CEPR’s web site is http://www-cepr.stanford.edu.

EDWARD L. GINZTON LABORATORY

Director: David A. B. Miller

The Ginzton Laboratory houses the research activities of a number of faculty members from the Departments of Applied Physics, Electrical Engineering, Materials Science and Engineering, and Physics. The multidisciplinary foundations
of faculty, students, and research provide a dynamic academic environment for a broad spectrum of scientific research including acoustic and optical techniques for semiconductor measurements, fiber optics, optoelectronic devices and systems, high temperature superconductors, laser physics, mesoscopic devices, pico-second optical electronics, squeezed light, scanning optical microscopy, and tunneling and force microscopy.

W. W. HANSEN
EXPERIMENTAL PHYSICS LABORATORY (HEPL)

Director: Robert L. Byer

HEPL is engaged in basic research in high energy physics, astrophysics, accelerator physics, and low temperature physics, which currently includes experiments involving superconducting accelerators and free electron lasers, detection of gravity waves and experiments in space for tests of relativity, gamma-ray and x-ray astronomy, solar physics, and low temperature physics.

STANFORD HUMANITIES CENTER

Director: Keith Michael Baker
Associate Director: Susan E. Dunn

The Stanford Humanities Center promotes humanistic research and education at Stanford and nationwide. Its programs include: fellowships for advanced research by faculty from Stanford and other institutions; fellowships for advanced Stanford graduate students; research workshops for faculty and graduate students; and public presentation of new work in the humanities through lectures, colloquia, conferences, and publications. In particular, the Stanford Humanities Center stresses work of an interdisciplinary nature.

Fellows are selected on the basis of an open competition. They pursue their own research and participate in a weekly seminar at the center throughout the year. Faculty fellows also contribute to the intellectual life of the Stanford community through activities such as giving departmental courses or organizing conferences. The courses given by fellows in 1997-98 are listed below.

COURSES

ANTHROPOLOGY

243. Culture as Commodity
5 units, Aut (Ebron)

CLASSICS

315. Ovid’s Metamorphoses
4-5 units, Win (Segal)

321. The Locrian Maidens
5 units, Spr (Redfield)

ENGLISH

368. Seminar: Lot’s Daughters—The Theme of Father—Daughter Relationships in 19th- and 20th-Century Fiction and Culture
4-5 units, Aut (Polhemus)

HISTORY

268. Undergraduate Colloquium: Adolescence and Youth Cultures in Modern America
5 units, Win (Cahn)

274A/374A. Medicine, Technology, and the Body in the Late 20th-Century America
4-5 units, Win (Bender, Lenoir)

LINGUISTICS

251. Pidgin and Creole Sociolinguistics
4 units, Spr (Rickford)

SLAVIC LANGUAGES AND LITERATURES

148/248. Totalitarian Cinema
3 units, Aut (Dobrenko)

THE INSTITUTE FOR INTERNATIONAL STUDIES (IIS)

Director: Walter P. Falcon

The Institute for International Studies coordinates research on contemporary, policy-relevant issues that are international and interschool in character. Working in partnership with the seven schools at Stanford (Business, Earth Sciences, Education, Engineering, Humanities and Sciences, Law, and Medicine) and with the Hoover Institution, IIS fosters excellence in research and teaching across disciplinary, school, and national boundaries. The priority areas of research are in the fields of international security, international political economy, and the global environment. Projects organized by IIS programs often have a regional or global focus; geographic strengths are the Americas, East and Southeast Asia, the New Europe, and Russia.

Research programs within IIS include the Asia/Pacific Research Center, the Center for International Security and Arms Control, the European Forum, the Forum on Sovereignty and Governance, the Global Environment Forum, and the North America Forum. IIS also administers over-
seas research centers in Kyoto, Japan, and Chiapas, Mexico, and, on behalf of a consortium of major universities, administers an advanced language study program in Yokohama, Japan.

In the areas of public service and outreach, IIS administers the Stanford Program on International and Cross-Cultural Education (SPICE) which develops internationally-oriented curricula for use by public school teachers and provides staff development opportunities for precollegiate educators interested in other cultures, world regions, international systems, and foreign languages. Current work includes curricular development projects on Africa, China, Japan, Latin America, the former Soviet Union and Eastern Europe, and Western Europe.

Although IIS shares a number of faculty appointments with departments and schools, it neither offers courses nor confers degrees. These academic functions are performed within the schools, departments, and programs associated with the institute. IIS is responsible, however, for the Interschool Honors Program in Environmental Science, Technology, and Policy. The institute also offers several fellowship opportunities for faculty and graduate students research.

The IIS central office is located at 200 Encina Hall, telephone (650) 723-4581. For more information about particular IIS programs, contact the programs directly (area code 650):

- Asia/Pacific Research Center, 723-9741
- Center for International Security and Arms Control, 723-1625
- European Forum, 723-9593
- Forum on Sovereignty and Governance, 723-4581
- Global Environment Forum, 725-9888
- Inter-university Center for Japanese Language Studies, 725-1490
- North America Forum, 723-9593
- Stanford Computer Industry Project, 725-7096
- Stanford Japan Center—Research, 725-1491
- Stanford Program on International and Cross-Cultural Education (SPICE), 725-1485

UNDERGRADUATE PROGRAM

INTERSCHOOL HONORS PROGRAM IN ENVIRONMENTAL SCIENCE, TECHNOLOGY, AND POLICY

The institute coordinates a University-wide interschool honors program in environmental science, technology, and policy. Undergraduates planning to participate in the honors program are required to pursue studies in environmental sciences, technology, and policy, with a concentration in a single discipline. After completion of the prerequisite units, students join small group honors seminars to work with specific faculty members in the environmental field on an honors thesis that incorporates both scientific principles and policy aspects of selected environmental issues.

Courses in environmental studies appear under the course listings of the schools of Earth Sciences, Engineering, and Humanities and Sciences. Information about and applications to this program may be obtained from the Global Environment Forum, 200 Encina Hall, telephone (650) 725-9888.

COURSES

195. Interschool Honors Program in Science, Technology, and Policy—Students from the schools of Humanities and Sciences, Engineering, and Earth Sciences analyze important problems in a year-long small group seminar. Combines research methods, oral presentation, preparation of an honors thesis by each student, and where relevant, field study.

9-15 units, Aut, Win, Spr (Naylor, Goulder, Schneider, Matson)

CENTER FOR THE STUDY OF LANGUAGE AND INFORMATION (CSLI)

Director: John Perry

CSLI is devoted to research in the emerging science of information, computing, and cognition. It is an interdisciplinary endeavor, bringing researchers together from academe and industry in the fields of artificial intelligence, computer science, linguistics, logic, philosophy, and psychology. CSLI’s researchers are united by their common interest in the communication and information processing that ties together people and machines. They are pursuing a wide variety of topics, including robotics design, planning and reasoning, speech recognition, machine-aided translation, language acquisition, text understanding, computer languages, and software design strategies, among others. Roughly half the projects at CSLI deal with languages (natural and computer) and the vehicles by which information is communicated between agents. The others deal with a variety of questions involving the acquisition and manipulation of information: how agents acquire and use information to guide action; what information processing architectures are best suited to various tasks; how representational format affects information processing and human comprehension, and so on.

Course work related to the research at CSLI can be found in the “Program in Symbolic Systems” section of this bulletin.
CSLI is located at the corner of Campus Drive West and Panama Street, in Ventura Hall and Cordura Hall, telephone (650) 723-3084.

**CENTER FOR MATERIALS RESEARCH (CMR)**

**Director:** M. R. Beasley

CMR is one of several National Science Foundation Materials Research Science and Engineering Centers located at various U.S. universities. CMR provides both facilities for the Stanford materials research community and supports multidisciplinary materials research projects involving faculty from various departments. Located in the McCullough Building, it has programs for support of summer research by undergraduates and for outreach to local high schools.

CMR supports a wide range of facilities for advanced materials characterization which include transmission electron microscopy (TEM), scanning electron microscopy (SEM), scanning probe microscopy (SPM), electron microprobe (EM), x-ray diffraction analysis, micro Raman spectroscopy, x-ray photoelectron spectroscopy (XPS), and Rutherford backscattering (RBS). To serve the synthesis and materials fabrication needs of the community, CMR also supports the vapor phase synthesis and bulk crystal growth facilities. Also by special arrangement through CMR, nuclear magnetic resonance spectroscopy (NMR), variable angle spectro-ellipsometry, Auger electron spectroscopy (AES), Scanning Auger microprobe (SAM), nanoindentation, and x-ray absorption spectroscopy techniques (for example, EXAFS, NEXAFS, SEXAFS), as well as core level photoemission and photoelectron diffraction are available to the materials research community through the Stanford Synchrotron Radiation Laboratory (SSRL).

CMR also sponsors programs for women, programs for minorities, seed programs, and multi-investigator, multi-discipline IRG programs. CMR’s professional staff also conduct research in areas related to advanced materials synthesis and characterization.

**INSTITUTE FOR RESEARCH ON WOMEN AND GENDER**

**Director:** Laura L. Carstensen (Associate Professor, Psychology)

During the last decade, research on women and gender has had a profound effect on the social and medical sciences, and the humanities. Since its founding, the Institute for Research on Women and Gender has been a leading force in this conceptual revolution.

The institute’s primary mission is to support scholarship on subjects related to women and gender and to organize educational programs that communicate these findings to a broader public. Stanford faculty, staff, graduate students, and members of the community work together to stimulate a more informed analysis of issues concerning gender.

Institute projects span a wide range of disciplines but rest on certain shared premises: that gender is a vital category of analysis for contemporary scholarship and policymaking and that the experiences of women as individuals and as a group can best be understood within their historical, social, and cultural contexts. The institute sponsors interdisciplinary research seminars and conferences that examine gender issues in areas such as art, education, employment, family structures, health care, history, law, literature, and psychology. A number of scholarly publications have resulted from these activities.

**HOOVER INSTITUTION ON WAR, REVOLUTION AND PEACE**

**Director:** John Raisian

Notable ongoing research in international studies includes the Program on Democracy and Free Markets, which studies political and economic transition as regimes in Africa, Asia, Central and Eastern Europe, the Commonwealth of Independent States, and Latin America experiment with democratic institutions and processes and with economic reforms. Research examines the conditions that promote democracy’s development—open economies, civil liberties, political freedom—as well as conditions that threaten it.

A second major area of research is the Program on International Rivalries and Global Cooperation, which studies questions of war and peace, and all types of rivalries and cooperation: economic, political, military, religious, cultural, and so on. This includes work on the causes and consequences of international conflict, global security policy, the principles of statecraft, and the emergence of global trading blocs.

In the area of domestic affairs, a major focus of research the Program on American Institutions and Economic Performance. Theoretical work on economic efficiency and effective government is combined with empirical work on specific areas of public policy, including taxation, the federal budget, government accountability, regulatory burden, education, race relations, the environment, crime, health care, aging, and social security.
The Stanford Linear Accelerator Center is devoted to experimental and theoretical research in elementary particle physics, to the development of theory and new techniques in high energy accelerators, and to research and development in particle detectors. The Stanford Synchrotron Radiation Laboratory (SSRL), a division of SLAC, operates the SPEAR storage ring as a source of intense vacuum ultraviolet and x-ray beams for research in physics, chemistry, biology, and material science. The center is on 425 acres of Stanford property west of the main campus and is operated under a contract with the Department of Energy.

SLAC is operated by Stanford as a national facility so that qualified scientists from universities and research centers throughout the country and world, as well as those at Stanford, may participate in the high energy physics research program of the center. Stanford graduate students may, with the approval of their departments, carry out research for the Ph.D. degree with members of the SLAC faculty. Graduate students from other universities also participate in the research programs of visiting groups.

Research assistantships are available for qualified students by arrangement with individual faculty members. There are also opportunities for summer employment in the research groups at the center. Interested students should contact Professor Elliott Bloom, the Graduate Student Adviser.

SSRL is a national research facility supported by the Department of Energy for the utilization of synchrotron radiation for research in the natural sciences, medicine, and engineering. SSRL is a division of the Stanford Linear Accelerator Center.

SSRL has research programs in accelerator physics and development of advanced sources of synchrotron radiation, including short-wavelength free electron lasers. The lab is interdisciplinary with students from the following Stanford departments actively pursuing degrees: Applied Physics, Chemical Engineering, Chemistry, Electrical Engineering, Earth Sciences, Materials Science and Engineering, Physics, and Structural Biology.

Students interested in working at the facility should contact a member of the SSRL faculty, one of the Assistant Directors, or other members of the Stanford faculty who use SSRL in their research programs.
STANFORD UNIVERSITY
LIBRARIES AND
ACADEMIC INFORMATION
RESOURCES

University Librarian and Director of Academic Information Resources: Michael A. Keller

Stanford University Libraries and Academic Information Resources develops and implements services within the University libraries that support research and instruction including academic computing functions. These services include acquiring and making available library collections and academic computing hardware and software, establishing policies and standards to guide the utilization of academic information resources, developing training and support programs for academic uses of computers, and maintaining the on-line library catalog. The major library units provide educational activities in support of the University curriculum; Meyer Memorial Library, for example, places particular emphasis on media collections, curriculum development, and multimedia information resources.

In each library unit, reference staff provide general advice on locating and using both print and on-line information sources. Subject specialists and reference librarians offer assistance in specific disciplines either individually or in groups, by lecture to classes on request, tours, demonstrations, or special workshops.

The Research and Instructional Technologies Support (RITS) group supports and enhances instruction and research by providing library and academic computing services and resources. These services include on-line text and database services for use in instruction and research; information, advice, and education about computers; and operation of the computer clusters and classrooms in Meyer Library.

Information about scope of collections, physical facilities, and services (such as general borrowing regulations, reserve books, book stack access, interlibrary loans, and photocopies) is available in printed publications and guides and electronically through the World Wide Web (http://www-sul.stanford.edu/). Anyone wishing further explanation of library services should consult the Privileges Desk or the reference staff in Cecil H. Green Library or reference staff in the University Libraries branches.

The Academic Software Development group develops applications and tools that assist Stanford faculty in performing their instruction and research.

CECIL H. GREEN LIBRARY

Cecil H. Green Library maintains research collections in the humanities, social sciences, area studies, and interdisciplinary areas. These collections, which number more than 2.4 million volumes, are now housed in two locations: the stack area of Green Library and the Stanford Auxiliary Library. During regular academic sessions, Green Library is open Monday through Thursday from 8 a.m. to 12 midnight, Friday from 8 a.m. to 6 p.m., Saturday from 9 a.m. to 5 p.m., and Sunday from 1 p.m. to 12 midnight. More detailed information, including holiday and intersession hours and hours for other libraries on campus, is given in the handout "Hours for the Academic Year," available in public service units throughout Green, Meyer, and the branch libraries.

The Green Library collections and services are currently distributed in two interconnecting buildings known as the East Wing and the South Stack. The East Wing is the building facing the J. Henry Meyer Memorial Library; the South Stack consists of the two basement floors of the Meyer Library. The West Wing, the former Main Library, faces the Quadrangle and is currently closed for repairs from damage sustained in the 1989 Loma Prieta earthquake. All stack areas, whether East, South, or West are accessible only through the East Wing. The facility can seat more than 1,600 users at one time in a variety of seating arrangements—carrels, lounge areas, tables, individual studies, and group study rooms.

Major service units housed in the East Wing include General Reference; Foreign Language and Area Collections; Access Services; Current Periodicals, Newspapers, and Microtexts; and the Interlibrary Borrowing Service Office.

East Wing facilities include Socrates terminals; photocopy machines and courtesy phones in the Communications rooms on the lower, second, and third levels; and three photocopy machines and a photocopy dispenser in General Reference on the first level. There are pay phones on each of Green East's four floors. Microcomputer clusters are available for use by Stanford faculty, staff, and students. Requests for information should be made to the Loan Desk.
The J. Henry Meyer Memorial Library is the media and instructional support library for Stanford University. Meyer houses the University's language laboratory, a computer classroom, a computer cluster, and a Curriculum Development Lab.

Reserves for most graduate and undergraduate courses in the humanities and social sciences are kept in Meyer. The course reserves include microcomputer software and audiovisual as well as book materials. Study space is located amid the intensive-use collection on the third floor.

The media collections and facilities are located on the second floor of the library and are available for individual or group use. Rooms for small group viewing or listening are available on a scheduled basis. Nonprint reserve materials are also located within this facility, as is the Media Rental Service. A cluster of Macintosh microcomputers is available to students for course work and independent study.

BRANCH LIBRARIES

Humanities Branch Libraries include the Art and Architecture Library, the Cubberley Education Library, and the Music Library (including the Archive of Recorded Sound).


COURSES

The following are intended to serve those students for whom a more extended study of bibliographic organization is useful.

ART

236. Art History Bibliography and Library Methods
4 units, Aut (Ross)

FRENCH AND ITALIAN

201E. Definition and Inquiry: Colloquium on Research Methods in French and Italian
3 units, Aut (Parrine)

GERMAN STUDIES

175A. Modernization, Technology, and Culture in Germany, 1900 to 1945—(Same as 175/275.)
4 units, Win (Lowood)

MUSIC

200. Graduate Proseminar
4 units, Aut (Hadlock, Nagy)

SLAVIC LANGUAGES

200A. Slavic Bibliography
1 unit, Win (Zalewski)

LIBRARIES-COORDINATES

J. Hugh Jackson Library, Graduate School of Business
Director: Tim Wei
Lane Medical Library
Director: Peter Stangl
Crown Law Library
Director: Lance E. Dickson
Stanford Linear Accelerator Center Library
Head Librarian: Patricia Kreitz

HOOVER INSTITUTION ON WAR, REVOLUTION AND PEACE

Director: John Naisian
Deputy Director: Charles G. Palm

Since its founding by Herbert Hoover in 1919 as a special collection dealing with the causes and consequences of World War I, the Hoover Institution on War, Revolution and Peace has become an international center for documentation, research, and publication on political, economic, social, and educational change in the 20th century.

The library includes one of the largest private archives in the world and has outstanding area collections on Africa, East Asia, Eastern Europe, Russia and the former Soviet Union, Latin America, the Middle East, North America, and Western Europe.

Holdings include government documents, files of newspapers and serials, manuscripts, memoirs, diaries, and personal papers of men and women who have played significant roles in the events of this century, the publications of societies and of resistance and underground movements, and the publications and records of national and international bodies, both official and unofficial, as well as books and pamphlets, many of them rare and irreplaceable. The materials are open to all Stanford students, faculty, and staff, and to scholars from outside the University.
ITSS provides University leadership for the planning, development, acquisition and operation of university-wide networking and telecommunications services, information systems, data administration, and information technology infrastructure support services for instruction, research, and administrative activities. Core services provided to the Stanford Community include:

- Applications support Information architecture, planning, and standards
- Computer and campus network operations; and assessment and application of new technologies.
- Data administration, data warehouse services
- Data, voice, and video communications
- New information systems acquisition, assembly, and integration
- Technology training, consulting, and help desks

More information about the complete range of ITSS services, supported systems, and application initiatives can be found on the web at: http://www-leland.stanford.edu/dept/itss.

**COMPUTING SERVICES**

Production computing services are provided by ITSS from both the Leland and Forsythe Operations Centers. These services include access to distributed software (for example, Netscape and Eudora), public domain software, major programming languages, commercial statistical packages, Stanford developed applications, and the Stanford University Network (SUNet). Stanford faculty, staff, and students who have a valid Stanford ID may apply for a SUNet ID (Stanford University Network Identifier) on the web at: http://www-leland.stanford.edu/group/itss/services/sunetid. SUNet IDs provide access to Stanford's network and the Internet, an email account, disk space for Web pages and email, and site-licensed software. Additionally, ITSS computer based services include screen-text editing (WYLBUR, emacs, pico), electronic mail (EMS, elm, pine) and formatting (SCRIPT) for preparing reports, data, and theses; SPIRES, the Stanford-developed database management system; Oracle and Sybase relational database environments; Prism, the on-line collection of Stanford administrative files and services; and Folio, the on-line collection of Stanford's academic and institutional data resources, including a large number of index and citation databases (ERIC, GeoRef, Lexis/Nexis, Merck, Federal Register); Socrates, Stanford's on-line library catalog; Usenet newsgroups, World Wide Web services, and an increasing number of client/server based applications including the Oracle financial applications. Detailed information regarding these services is available on the web at: http://www-leland.stanford.edu/dept/itss/services. Specific questions regarding ITSS computing services can be sent to consult@forsythe.stanford.edu, or call (650) 725-8181.

**VOICE, VIDEO, DATA, AND NETWORKING**

ITSS provides telephone, paging, and video conferencing services for Stanford faculty, staff, and students and also runs the paging service for the hospital. The internal network maintained by ITSS allows for high speed access to Stanford networking services and external networks including the Internet. Dial-in service through the modem pool allows remote access to University host computers. ISDN support has recently been added to the range of ITSS services, and an agreement with Internet Service Provider NetCom allows for discounted subscription rates for high-speed dial-in access for Stanford faculty, staff, and students. Additionally, ITSS manages Stanford's cable television channel, Channel 51, and the STV cable subscription service for students residing on campus.

**COURSES**

UNIX, Leland, E-mail—Introductory information about UNIX on the Leland Systems, the EMACS text editor, electronic mail, and the Tre-sidder and Meyer Computer Clusters. Full class descriptions are available on the web at: http://consult.stanford.edu/introclasses.html.

The Stanford Computer Environment, the Internet, Portfolio, Windows, and Macintosh Applications—Word processing and text formatting, database management, statistical and programming applications, desktop publishing, spreadsheets, html, and communications. Class descriptions, schedules, and registration information are available on the web at: http://www-leland.stanford.edu/group/itss-customer/ip/.
THE CONTINUING STUDIES PROGRAM

Dean: Marsh McCall
Associate Dean and Administrative Director: Charles Junkerman

The Continuing Studies Program provides adult members of the surrounding communities and University staff with the opportunity to take classes on a part-time basis for intellectual enrichment, both personal and professional.

The faculty are drawn from the ranks of the University's distinguished professoriate, representing every school in the University. The program presents a wide variety of courses, with a central concentration in such humanities disciplines as literature, history, music, and art.

The program also offers a Master of Liberal Arts degree, which emphasizes a flexible, interdisciplinary approach to enable adults to seek a broad education in the liberal arts.

Courses are offered in all four academic quarters. For a course catalog, contact the Continuing Studies Program, Building 590, Room 104, Stanford, California 94305 or call (650) 725-2650.

THE SUMMER SESSION

Students attending Stanford Summer Session enroll in either the Regular Degree Program or the Summer Visitor Program.

The Regular Degree Program is for students who are candidates for a Stanford degree and who are continuing their academic work in the Summer Quarter. Degree-seeking Stanford students should indicate on Axess their intention to register for the Summer Quarter. Separate application is not required.

The Summer Visitor Program is for students who are not presently candidates for a Stanford degree. It is open to persons 18 years or older, and high school students who have completed their junior year. High school students may only attend through the Summer College for High School Students.

Students in the Summer Visitor Program enjoy all the privileges of students in the Regular Degree Program except that work completed cannot apply toward a Stanford degree or credential until the student has been admitted to regular standing. Admission as a summer visitor does not imply later admission to matriculated status. However, should the visitor matriculate at a later date through normal admission procedures, the summer work may, in most cases, be applied toward the requirements for a Stanford degree or credential.

Students who are interested in the Summer Visitor Program may call (659) 723-3109 or fax their request for a copy of the Stanford University bulletins, Summer Session Catalogue or Summer Session for High School Students Catalogue to (650) 725-4248, or write to the Summer Session Office, Building 590, Stanford University, Stanford, California 94305-3005. These bulletins include all the pertinent information (for example, fees, housing, activities, course listings) and an application form.
STUDENT AFFAIRS

Student Affairs supports the academic mission of the University by providing a climate conducive to living and learning in a diverse community. The organization encompasses a broad range of programs and services for undergraduate and graduate students in the areas of health services, student life, residential education, advising and tutoring, career services, housing and food services, financial services, and registration. It serves the wider community through the Haas Public Service Center and is responsible for the information systems and institutional reporting on students, courses, and classrooms.

The Vice Provost for Student Affairs provides policy direction, administrative support for budget, personnel, facilities, and development, and has oversight of the efficiency and effectiveness of each of the organization’s units. The Vice Provost interacts with the President, the Provost, the University Cabinet, schools, department representatives, and students, and is an ex officio member of the Senate of the Academic Council.

DEAN OF STUDENTS

The Office of the Dean of Students seeks to ensure that the University is sensitive and responsive to the needs of students outside the classroom. The office is responsible for Judicial Affairs and several administrative offices and community centers including the Asian American Activities Center; Black Community Services Center; El Centro Chicano; Native American Cultural Center/American Indian Program Office; Bechtel International Center; the Office of the Multicultural Education; Lesbian, Gay, and Bisexual Community Center; Women’s Center; Disability Resource Center; Tresidder Memorial Union, and the Office of Student Activities including Greek Affairs. The office also provides consultation and coordination with student organizations, student media, activities, publications, and the Associated Students of Stanford University. The office is located in Tresidder Memorial Union, telephone (650) 723-2733. Students are welcome to visit the Dean of Students to discuss ideas, personal issues, or general concerns about student life.

DISABILITY RESOURCE CENTER (DRC)

The Disability Resource Center is the central administrative office that coordinates a variety of services and resources for undergraduate and graduate students with documented disabilities. The students who use the DRCs services have a variety of disabilities, including mobility impairments, learning disabilities, chronic illness, psychological disabilities, and sensory disabilities. The mission of the DRC is to provide disabled students equal access to all facets of university life: education, housing, recreation, and extracurricular activities. To initiate services, a student contacts the DRC directly and meets with a program coordinator to determine what services and accommodations will support the student’s disability-related needs. Students who are eligible for services are asked to submit professional documentation of their disabilities to the DRC. Services include, but are not limited to, notetaking, braille, oral or sign language interpretation, stenocaptioning, books on tape, extended time on examinations, and a distraction free room for taking examinations. The DRC also has available adaptive computer equipment in a work station in Meyer Library. During the academic year, the DRC runs a golf cart service called DisGo Cart for use by students with temporary and permanent mobility impairments. The DRC is located at 123 Meyer Library; office hours are 9 a.m. to 12 noon and 1 to 5 p.m., Monday through Friday. For more information call the DRC at (650) 723-1066 (voice) or 723-1067 (TDD).

INTERNATIONAL CENTER

The Bechtel International Center (I-Center) is a meeting place for students and senior research scholars at Stanford from throughout the world and for internationally oriented U.S., students, faculty, and visitors on the campus. Through a variety of social, cultural, and educational programs, I-Center facilities are utilized to acquaint students and scholars with the life of the University and the community, and to bring them together in activities of mutual interest.

The I-Center emphasizes the international dimensions of the University through its counseling services, through the cultural contributions to campus life by the various nationalities represented, and by bringing to the attention of U.S. students the many opportunities for work, volunteerism, study, and travel abroad.

Responsibilities of the I-Center advisers, working closely with the University’s academic departments, include advising foreign students on matters such as immigration, housing, practical training, transactions with foreign governments, study programs, and financial-aid problems; counseling in personal matters relating to academic performance, psychological and cultural adjustment, and proficiency in English; coordinating the in-
ternational reception and orientation program; encouraging utilization of foreign students as resource people in a variety of academic programs; and evaluating the Stanford experience after the students return home.

TRESIDDER MEMORIAL UNION

Tresidder Memorial Union (TMU) is a center of community activity on the Stanford campus. It houses food services; meeting rooms for special occasions; two pleasant patios; a campus information center; the American Express Travel service; banking services, including automatic tellers for Stanford Federal Credit Union and Bank of America; a Wells Fargo branch office with express stops, walk-up windows, and an office for account handling and loan applications; a recreation center offering billiards, foosball, and video games; and a hairstyling shop. Tresidder Express carries groceries, magazines, and sundries.

TMU is also the home of the Associated Students of Stanford University (ASSU), and the Office of Student Activities/Dean of Students office.

A full range of food services is provided at TMU. The main dining area includes The Cafe, which features hot entrees and a salad bar; The Corner Pocket, which specializes in pizza; and Baker Street, which has coffee and pastries, salads and sandwiches, and frozen yogurt. The Coffee House, a Stanford tradition, offers deli-style dining, beer, wine, and regular evening entertainment. The Patio Grill cooks made-to-order burgers and chicken sandwiches. Bon Appetit Catering provides food and personalized service for events.

To learn more about activities in Tresidder Union, as well as events on and off campus and employment opportunities, stop by the Information Center on the first floor, or call (650) 723-3384.

VOLUNTARY STUDENT ORGANIZATIONS

At its March 1963 meeting, the Board of Trustees adopted the following policy:

"Students are encouraged to study, discuss, debate, and become knowledgeable about contemporary affairs. Expressing opinions or taking positions with respect to these matters is up to the individual students or to volunteer groups of students so constituted that they are authorized to speak for their members. This is not a function of student government at Stanford.

"All students are required to become members of the Associated Students of Stanford University, which represents them with respect to student affairs on the Stanford campus. The student government, under this policy, is not authorized to speak for students on other matters.

"Under such regulations as may be established from time to time by the President of the University, students may form voluntary organizations constituted to speak for their members with respect to matters outside the scope of student government, provided such organizations clearly identify themselves and, in any public statements, make it clear that they do not represent or speak for the University or the Associated Students.

"Any questions concerning the interpretation and application of this policy shall be resolved by the President of the University."

"Voluntary student organizations are those organizations (1) in which membership is not mandatory, (2) in which membership is both open and limited to members of the Stanford community, that is, Stanford students, faculty members, and staff, and their immediate families, and (3) whose purposes and procedures are not inconsistent with the goals and standards of the University. In order to use University facilities and/or the Stanford name, all voluntary student organizations must register with the University through the Office of Student Activities/Dean of Students Office on the second floor of Tresidder Memorial Union.

As conditions of registration, each voluntary student organization must file the following:

1. A statement of purpose and organizational constitution.
2. A statement about membership eligibility.
3. A statement that, should Stanford facilities be used for the generation or collection of funds, all funds of the organization shall be deposited with the Students' Organizations Fund (SOF) in the ASSU Office and shall be handled by the Treasurer of the organization in the manner prescribed by the rules and regulations of the fund and of the ASSU. (Sectarian religious organizations in the Stanford environs may be exempt from the requirement of membership in the SOF, with the approval of the Student Financial Manager and OSA.)
4. Identification of the authorized representative of the group, who must be a currently registered student, and at least five active members in the organization who are currently registered students.

"Each voluntary student organization must renew its registration with the University annually, early in Autumn Quarter, by submitting the name of the new authorized representative or by reconfirming the current representative, and by updating other information.

If a voluntary student organization that is registered with the University seeks to use University facilities for meetings open to more than its own members and to specifically invited guests, such meetings shall be subject to the regulations of the Committee on Public Events. Contact Non-
academic Facilities Scheduling, the Registrar’s Office, B8, Old Union, for further information about nonacademic room scheduling.

A voluntary student religious organization may hold open meetings in University facilities only with the approval of the Office of the Dean of the Chapel.

A registered voluntary student organization may advocate publicly a position on a public issue, provided the organization clearly identifies itself, and provided such an organization in any public statement makes clear it does not represent or speak for the University or for the Associated Students.

No student group may use University space or facilities or receive University support for purposes of supporting candidates for public office. In accordance with procedures governing public events, groups supporting candidates may have use of public places such as White Plaza for tables, speeches, and similar activities; may have intermittent use of on-campus meeting rooms; and may reserve auditoriums and similar space for public events including speeches by political candidates.

Religious Activities—Religious and ethical concerns are shared by a significant number of Stanford undergraduate and graduate students, many of whom are actively involved in a variety of campus religious organizations. In addition to a range of Christian groups, there are the Hillel Foundation, the Islamic Society at Stanford, the Baha’i Association, Hinduism, Zoroastrianism, and Buddhism at Stanford. The larger worship gatherings are the Shabbat services and dinners on Fridays at 6:30 p.m. and monthly dinners in the Old Union Clubhouse, Catholic Mass on Sundays at 4:30 p.m. in Memorial Church, and University Public Worship (Protestant Christian) at 10 a.m. on Sundays in Memorial Church. Black Church at Stanford meets at 6:30 p.m. on Sundays during the academic year in Memorial Church.

The University’s commitment to the process by which convictions and values are defined and sharpened is manifest in its chaplaincy staff, and its support of the diverse religious groups on campus. Central in Stanford’s history, from its founding, is multi-faith exploration and dialogue—a vital part of both ethos and education in this institution. For further information about religious life at Stanford, call Memorial Church (650) 723-1762.

JUDICIAL AFFAIRS AND STUDENT CONDUCT

The Board of Trustees at its September 1963 meeting adopted the following statement, entitled “The Government and Conduct of Students: The Fundamental Standard and the Honor Code.”

“In student affairs, Stanford seeks the largest individual liberty consistent with good work and orderly conduct.

“The authority and responsibility for student conduct and discipline have been vested in the President of the University by the Board of Trustees.

“In order to encourage responsible citizenship and the exercise of individual and corporate responsibility on the part of students in the government of student affairs and activities, the University has authorized the Associated Students of Stanford University to exercise major privileges and responsibilities through its constitution and in a manner consistent with the policies and regulations established by the University and the Board of Trustees.”

In 1996-97, the committee of Fifteen proposed a new judicial charter to the Associated Students of Stanford University, the Senate of the Academic Council, and the President of the University. It is anticipated that this new charter, The Student Judicial Charter of 1997, will go into effect beginning Winter Quarter, 1997-98. In the meantime, The Legislative Charter of 1968 remains in effect.

LEGISLATIVE, JUDICIAL, AND ADVISORY BODIES

Legislative, judicial, and advisory bodies for student conduct are bodies whose nature and function are specified in The Legislative and Judicial Charter of 1968, as published by the President’s Office. These bodies include:

Committee of Fifteen (C-15)

Stanford Judicial Council (SJC)

Student Conduct Legislative Council (SCLC)

THE LEGISLATIVE AND JUDICIAL CHARTER

The Legislative and Judicial Charter was approved by the students, the faculty, and the President in 1968. The charter created two university committees: the Student Conduct Legislative Council (SCLC) and the Stanford Judicial Council (SJC). The SCLC, consisting of five students, six faculty, and a chair appointed from the faculty, is charged with the responsibility of promulgating regulations governing student conduct and establishing disciplinary sanctions for use by the SJC.

Amendments to Article II of the charter were approved by the students, faculty, and President in 1975. Article II provides for the composition and operation of the SJC, which deals with all student disciplinary cases. The council is made up of three faculty members chosen by the Academic Senate; three students chosen by the ASSU Senate from a randomly selected pool; a faculty co-chair, chosen by the President, who presides over all cases except those involving Honor Code violations; and a student co-chair also chosen by
the President, who presides over Honor Code cases.

If there are contested issues of fact, they are resolved at a hearing before a Hearing Officer (an attorney not associated with the University). The SJC determines whether the facts, as found by the Hearing Officer, constitute a violation of University regulations and, if so, recommends to the Provost, or Vice Provost for Student Affairs an appropriate penalty.

In the alternative, a student may have his or her case heard by the Dean of Students, if the student so requests and the dean agrees. In such cases, the dean recommends to the Provost, or Vice Provost for Student Affairs an appropriate penalty.

When a violation of the Fundamental Standard or the Honor Code occurs, the University administration pursues the case to completion. Consequently, whenever a member of the University community believes such a violation has occurred, he or she should contact the Office of Judicial Affairs, Tressider Memorial Union, 2nd floor, (650) 723-9610.

THE FUNDAMENTAL STANDARD
Students are expected to observe the Fundamental Standard of student conduct, which was stated by Stanford's first President, David Starr Jordan, as follows:

"Students are expected to show both within and without the University such respect for order, morality, personal honor, and the rights of others as is demanded of good citizens. Failure to do this will be sufficient cause for removal from the University."

THE HONOR CODE
The Honor Code at Stanford is essentially the application of the Fundamental Standard to academic matters. Provisions of the code date from 1921, when the honor system was established by the Academic Council of the University Faculty at the request of the student body and with the approval of the President.

The standard of academic conduct for Stanford students is as follows:
A. The Honor Code is an undertaking of the students, individually and collectively:
1) that they will not give or receive aid in examinations; that they will not give or receive unpermitted aid in class work, in the preparation of reports, or in any other work that is to be used by the instructor as the basis of grading;
2) that they will do their share and take an active part in seeing to it that others as well as themselves uphold the spirit and letter of the Honor Code.
B. The faculty on its part manifests its confidence in the honor of its students by refraining from proctoring examinations and from taking unusual and unreasonable precautions to prevent the forms of dishonesty mentioned above. The faculty will also avoid, as far as practicable, academic procedures that create temptations to violate the Honor Code.
C. While the faculty alone has the right and obligation to set academic requirements, the students and faculty will work together to establish optimal conditions for honorable academic work.

"Examples of conduct which have been regarded as being in violation of the Honor Code include: Copying from another's examination paper or allowing another to copy from one's own paper Unpermitted collaboration Plagiarism Revising and resubmitting a quiz or exam for regrading without the instructor's knowledge and consent Giving or receiving unpermitted aid on a take-home examination Representing as one's own work the work of another Giving or receiving aid on an academic assignment under circumstances in which a reasonable person should have known that such aid was not permitted

"In recent years, most student disciplinary cases have involved Honor Code violations; of those, the most frequent is plagiarism. The ordinary penalty for a first offense is a one-quarter suspension from the University, a grade of "No Pass" for the class in which the violation occurred, a financial penalty, a letter of censure, and a work penalty. The ordinary penalty for a multiple violation (for example, cheating more than once in the same course) is a three-quarter suspension, a grade of "No Pass," a financial penalty, a letter of censure, and a work penalty.

INTERPRETATIONS AND APPLICATIONS
1. General
a) The Honor Code is agreed to by every student who registers at Stanford University and by every instructor who accepts an appointment.
b) The Honor Code provides a standard of honesty and declares that compliance with that standard is to be expected. It does not contemplate that the standard will be self-enforcing but calls on students, faculty, and administration to encourage compliance and to take reasonable steps to discourage violations. If violations occur, procedures are prescribed by the Legislative and Judicial Charter. However, the Honor Code depends for its effectiveness primarily on the individual and collective desire of all members of the community to prevent and deter violations rather
than on proceedings to impose penalties after violations have occurred.

c) It must be understood that the individual and collective responsibility of the students for upholding the Honor Code (including so-called third-party responsibility) was not imposed upon the students by the administration or the faculty but was assumed by the students at their own request. Without such student responsibility, the Honor Code cannot be effectively maintained.

d) In interpreting and applying the general provisions of the Honor Code, it should be kept in mind that although primary responsibility for making the code effective rests with the students, faculty cooperation is essential since the faculty sets the academic requirements which students are to meet.

The faculty should endeavor to avoid academic requirements and procedures which place honorable and conscientious students at a disadvantage. The faculty should also be ready and willing to consult with students and should be responsive to their suggestions in these matters.

2. Specific Interpretations and Applications

a) Third-Party Responsibility—A primary responsibility assumed by students is to discourage violations of the Honor Code by others. Various methods are possible. Drawing attention to a suspected violation may stop it. Moral suasion may be effective. Initiating formal procedures is a necessary and obligatory remedy when other methods are inappropriate or have failed. Faculty members have like responsibilities when suspected violations come to their attention.

b) "Proctoring"—Proctoring means being present in the examination room during a written examination, with the following exceptions:

1) The prohibition against proctoring should not be construed to prohibit an instructor or teaching assistant from remaining in the examination room for the first few minutes to distribute and explain the examination; or from visiting the examination room briefly to transmit additional information; or from returning at the end of the examination to collect the examination papers.

2) Nor does the prohibition against proctoring prohibit an instructor or teaching assistant from visiting the examination room in response to specific prior reports from students that cheating has been observed, in connection with that exam, to investigate the basis for such reports. The instructor or teaching assistant may also visit the examination room briefly and infrequently in order to answer students' questions.

c) "Unusual and Unreasonable Precautions"—In interpreting and applying this provision, consideration should be given to standard procedures that are customary at Stanford and the need for cooperation between students and faculty in making the Honor Code effective. The following situations are cited as examples.

An instructor should not require students to identify themselves before being admitted to an examination room, or require students to submit in advance to being searched for notes or other materials, or maintain surveillance upon students who leave the examination room. Nor should the instructor take deliberate steps to invite dishonesty in order to entrap students. Procedures of this kind would be unusual and unreasonable.

On the other hand, an instructor may require copies of an examination or test to be returned after the examination. When possible, alternate seating should be provided and used for all examinations. To avoid controversy in any rereading or regrading of students' work, the instructor may take measures by which the original work may be clearly identified. An instructor who requires students to make up a missed test or examination may administer a different test or examination of equivalent range and difficulty. Such procedures are not to be construed as unusual or unreasonable.

d) "Procedures that Create Temptations to Violate the Honor Code"—Although students are expected to resist temptations to cheat, the faculty should endeavor to minimize inducements to dishonesty. Examples of undesirable procedures include the following: failure to give clear directions and instructions concerning course requirements and the limits of acceptable collaboration in course work; treating required work casually as if it were unimportant; carelessness or inconsistency in maintaining security of examinations or tests; reusing an examination that is neither kept secure from public exposure nor made available to all students. If take-home examinations are given, they should not be closed-book examinations, nor should there be a specified time limit less than the full period between the distribution of the examination and its due date. Such procedures place honorable and conscientious students in a difficult position and often at a disadvantage.

e) Penalty Grading—Under the Legislative and Judicial Charter, students are not to be penalized for violations of the Honor Code without notice, hearing, and adjudication, as therein provided. An instructor may not, therefore, lower a student's
grade or impose any other academic penalty on the grounds of dishonesty in the absence of such formal proceedings.

f) Taking Tests outside the Examination Room—Provided that alternate seats are available, tests will be taken from the classroom only with the consent of the instructor.

THE STUDENT CONDUCT PENALTY CODE

The student conduct penalty code is subject to the provisions of the Legislative and Judicial Charter and is to be read with the following points in mind.

1. The Penalty Code operates only to govern the actions of the University’s judicial bodies regarding student conduct. It in no way governs the actions of persons in the discharge of their duties regarding the hiring or appointment of University personnel.

2. If any person charged with the duties of hiring, appointing, or discharging personnel, or of otherwise controlling employment for the University, promulgates any policy which relates to the fact of conviction for any offense which results in penalties under the code, such policy should be made explicit and should immediately be dispatched to the SCLC, the chairs of all relevant judicial bodies, and the Vice Provost for Student Affairs. In the event that the SJC or other relevant judicial body has not been notified of such a policy, and the implementation of the policy results in a possible injustice to the student, the judicial body which heard the case is encouraged to reopen the case and to reconsider the penalty.

3. Section II.c.2.a of the Penalty Code is intended to permit a judicial body (a) to suspend a student for the remainder of the quarter in progress, or (b) to suspend a student for the remainder of the quarter in progress plus one or more subsequent quarters, or (c) to permit a student to remain in school for the remainder of a quarter in progress and suspend that student for one or more future quarters.

TYPES OF PENALTIES

Upon determination that a student has committed an offense, the judicial body having jurisdiction shall impose a penalty in accordance with the nature and seriousness of the offense and the underlying motivation of the student. The following penalties, and only the following penalties, may be imposed:

A. Expulsion from the University
B. Indefinite suspension from the University
C. Suspension from the University until a specified date
D. Payment of a fine by work for an on-campus facility or organization
E. Payment of a fine by work for an on-campus facility or organization
F. Loss for a specified period of time of the right or privilege:
   1. To take part in intercollegiate activities, such as athletic contests, debating contests, or any similar activities as a representative of the University
   2. To serve in a non-committee position of trust and responsibility, such as resident assistant, sponsor, or any other position requiring appointment by the University administration or faculty
   3. To enjoy any other specific right or privilege on campus or to use University facilities
G. Probation for a specified period of time
H. Formal censure
I. Academic penalties for Honor Code violations
J. Combination of penalties

DEFINITION OF PENALTIES

A. Expulsion from the University is the permanent termination of an individual’s status as a student, with the loss of all rights and privileges appurtenant thereto.

B. Indefinite Suspension from the University
   1. Indefinite suspension is identical to expulsion while it is in effect.
   2. An indefinite suspension may be terminated provided the suspended student can demonstrate that this serves the interests of the University community.
   3. The judicial body (for example, the SJC, its appellate body, a subordinate council, or the Vice Provost for Student Affairs) which originally imposed the penalty is the only body which may terminate the suspension; provided, however, that if the agency which imposed the penalty no longer exists, then jurisdiction shall reside in the SJC; and provided further that if the penalty is imposed by an overseas council, the SJC, and only the SJC, may terminate the suspension.
   4. If the appropriate judicial body wishes to consider the possible termination of a suspension, the judicial aide shall investigate and report the facts.
   5. In no event shall an indefinite suspension be terminated within two calendar years from the date the suspension began.

C. Suspension from the University until a Specified Date
   1. a) Suspension is the termination of student status until a specified date. During such period, the student under suspension loses all rights and privileges appurtenant to student status. These include, but are not exclusively limited to, the right to attend classes; utilize library facilities; utilize any other facilities of the University except those open to the general public;
obtain credit for any academic work; engage in any activities, including holding any positions whatsoever on any University committees or in student organization, whether appointive or elective; live in student housing; or in any way represent him/herself as or being entitled to the privileges of a student of Stanford University. While suspended, no student shall hold or continue to hold any position such as, but not limited to, sponsor, tutor, research assistant, teaching assistant, or residential assistant, if the student was informed prior to accepting that position—either directly or by public notice—that holding such position is contingent upon student status.

b) In the sole discretion of the Vice Provost for Student Affairs, where otherwise undue hardship would result, a student, although under suspension, may nevertheless be permitted to enjoy certain student benefits, such as being permitted to remain in University housing when the suspension is only for a short period of time.

2. a) No suspensions shall be for less than one academic quarter, except that a student may be suspended solely for the remainder of a quarter in progress.

b) With regard to any student regularly enrolled in the University under a program run totally or primarily on a semester basis, the word “quarter” shall be read as “semester” insofar as suspension is concerned.

c) No student who has been suspended in a future quarter shall be eligible to receive a University degree until the period of suspension has terminated.

3. A student under suspension or who has been suspended in a future quarter continues to be subject to University rules governing student conduct and shall be treated as a student for all disciplinary purposes.

D. Payment of a Monetary Fine

1. Prior to the payment of any fine imposed, no student shall obtain a degree from Stanford University.

2. a) Whenever ordered to pay a fine, the student shall be informed in writing of the time(s) by which specific amounts must be paid.

b) Every order to pay a fine shall be conditioned as follows: the Vice Provost for Student Affairs shall, upon application by the student, postpone the time that the work must be completed when, in the Vice Provost’s judgment, it appears necessary to avoid undue hardship. In no event, however, shall a University degree be awarded until that student has successfully completed the work.

c) A student who has failed to pay as ordered shall be treated as though suspended and shall be subject to all the disabilities of section C above until such time as full payment is made.

3. a) Except as provided in item paragraph b above, fines shall be paid to the Vice Provost for Student Affairs for use in assisting students who are in need of financial help.

b) A fine can be ordered paid to the Vice Provost and Dean for Student Affairs for use in defraying the actual financial losses of any individual or organization, which losses were directly caused by the offense for which the fine was imposed.

E. Payment of a Fine by Work for an On-Campus Facility or Organization

1. a) Prior to the imposition of such a penalty, the judicial body shall inquire of the student whether or not he or she has any objection in principle to penalties requiring involuntary imposition of work. If so, an alternative penalty shall be imposed.

b) Prior to successful completion of any work fine imposed, no student shall obtain a degree from Stanford University.

2. a) Any work fine shall specify the number of hours to be worked and set a deadline before which time the work is to be satisfactorily completed.

b) Every work fine deadline shall be conditioned as follows: the Vice Provost for Student Affairs shall, upon application by the student, postpone the time that the work must be completed when, in the Vice Provost’s judgment, it appears necessary to avoid undue hardship. In no event, however, shall a University degree be awarded until that student has successfully completed the work.

c) A student who has failed to meet a work fine deadline shall thereupon be treated as though suspended and shall be subject to all the disabilities of section C above until such time as the work is satisfactorily completed.

3. a) No work fine shall be imposed without prior agreement of the person responsible for the on-campus facility or organization where the work is to be done.

b) A written statement from the person responsible for the on-campus facility or organization that the student satisfactorily completed the work fine will be conclusive.

c) In the absence of the written statement in section D, 3, b, above, the Vice Provost for Student Affairs shall determine if and when the work has been satisfactorily completed. If the Vice Provost finds that
such completion has not occurred and the student disagrees, the SJC shall determine the issue.

F. Loss for a Specified Period of Student Rights and Privileges
1. Whenever a student is deprived of a right or privilege, both the specific right or privilege lost and the period of such loss must be stated in writing.
2. Under Article I, section F, 2, no student who has contracted with the University to provide personal services and who has entered into performance of the services shall have the contract terminated unless prior to or at the time of formal notification of appointment, the student was also notified, directly or by general publication of which he or she had reason to be aware, that the pertinent judicial body could impose termination of employment as a penalty.
3. Under Article I, section F, 3, a student may be deprived of such rights and privileges as living in University housing, using University machinery, driving a motor vehicle on campus, and other rights and privileges of this type.
4. The right or privilege of serving on any committee shall not be subject to restriction under Article I, section F.

G. Probation for a Specified Period of Time
1. Imposition of a penalty or any part of a penalty may be postponed for a specified period of time, during which the student shall be placed on probation.
2. A violation of the probation shall consist of conviction for an offense which was committed during the period of probation, unless the judicial body hearing the offense specifically deems it to be either trivial or non-related to the type of offense for which the probation was granted.
3. The postponed penalty shall be imposed following a determination that a violation of probation has occurred.
4. Should no violation of probation be determined to have occurred during the period of probation, the probation shall be terminated and the postponed penalty automatically shall be cancelled.
5. The judicial body may impose an independent penalty for the subsequent offense itself. In determining the penalty for the subsequent offense, the judicial body shall consider the reinstated penalty for the first offense and its severity, and may allow the initial penalty, as reinstated, to suffice for both offenses, or it may impose additional penalties.

H. Formal Censure
Formal censure shall consist of a letter of reprimand from the judicial body to the student, and it shall explain the reasons for the censure. The judicial body may request that the Provost or the Vice Provost and Dean for Student Affairs sign the letter of censure.

I. Academic Penalties for Honor Code Violations
1. An academic penalty may consist of the whole or partial withdrawal of credit for a course or an examination, or the determination of a grade for a course or an examination, including the awarding of a failing grade, or it may consist of a combination of these penalties. These penalties may be imposed only with respect to the course in which the violation occurred.
2. An academic penalty may be applied only in the case of an Honor Code violation and only with the consent of the instructor.

J. Combination of Penalties
The judicial body may impose a sentence combining various penalties, when it deems such action appropriate. For example, a penalty could consist of suspension for a quarter, plus probation (with postponement of a penalty of indefinite suspension) for a two-year period thereafter, during which time the student would not be permitted to live in University housing.

NOTIFICATION OF PENALTIES
All penalties must be specified in writing. No penalty becomes effective until reasonable efforts have been made to notify the student. In those instances when a delay in imposition of the penalty would, in the mind of the student, be detrimental, he or she may waive the right to written notice by so indicating in writing to the judicial body.

CAREER PLANNING AND PLACEMENT CENTER (CPPC)
CPPC is committed to educating the Stanford community about the world of work and helping individuals understand their relationship to it. We encourage both undergraduate and graduate students to consider how their academic course work and other experiences may affect their career decisions. Through a variety of programs and services, the CPPC staff helps students and alumni clarify their interests, skills, and values; explore possible career fields; and prepare for the job search in technology, business, public service, or academia. These services include:
- Career counseling
- Career interest inventories
- Workshops on how to get started at the CPPC, interviewing, internships, and the job search process
- Resource library, which includes books, periodicals, handouts, and audio/videotapes
- Odyssey, the internship database

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- Odyssey, the internship database
Job Hotline
Reference file service
On-Campus Recruiting Program
Stanford Career Fair in Autumn Quarter
Public Service Career and Internship Fair in Winter Quarter
Job Connection Day in Spring Quarter

"Internship information, as well as part-time and summer employment opportunities, are also available at the CPPC. Check the Monday Stanford Daily, the CPPC Calendar of Events, or the CPPC web page http://www-leland.stanford.edu/group/CPPC/ for up-to-date information on programs and events.

The CPPC, located on White Memorial Plaza between the Bookstore and the Clock Tower, is open Monday through Friday from 8:15 a.m. to 4:30 p.m.; telephone: (650) 723-3963.

COWELL STUDENT HEALTH SERVICE

Cowell Student Health Service provides medical care, including a range of counseling and mental health services, to regularly enrolled Stanford students. Most costs of care are paid for by the University, excepting specialty consultations, hospital care, and long-term care as described below.

MEDICAL CARE

The facility, at 606 Campus Drive, has a full-time staff of physicians and other health professionals. It provides, at no fee, an outstanding program of medical and psychological services to students holding current student body cards. Short-term registrants are covered, but only during the period for which they are registered.

Covered services include visits to Cowell physicians and other professionals; necessary examinations and most laboratory and x-ray tests (except when part of entrance requirements). The costs of hospitalization, specialty consultations, outpatient surgery, and specialized procedures, including physician fees, ancillary charges, and emergency room care, are not covered under Cowell’s program. To cover such costs, all students must carry the Stanford University Supplemental Insurance Plan called Cardinal Care or their own individual policy.

Hours—Cowell is open 8 a.m. to 9 p.m., Monday through Friday, and 10:30 a.m.-6 p.m. Saturday and Sunday during the main academic year and 8 a.m.-5 p.m. Monday-Thursday during the summer. The telephone is (650) 723-4841. A physician and other professionals are on call for urgent care at all other times.

Student Families—Services at Cowell are available for spouses and domestic partners (same and opposite sex) on a discounted fee-for-service basis.

Assistance is available at Cowell for securing pediatric care.

Stanford Conference Participants—Persons attending University-sponsored conferences, seminars, institutes, workshops, and the like, which do not require registration as a regularly enrolled student, are not eligible for Cowell benefits without cost. While they are welcome to seek medical treatment at the center, they will be charged as private patients at standard fees.

HAAS CENTER FOR PUBLIC SERVICE

The Haas Center for Public Service serves as a focal point for students, faculty, and staff interested in public and community service. The Haas Center maintains and coordinates volunteer, internship, and community research opportunities for undergraduate and graduate students in the San Francisco Bay Area, nationally, and internationally. Through the “study-service connections” initiative, the staff assists students and faculty seeking to integrate service-based learning with academic study and administers a Public Service Scholars honors research program.

The Haas Center is the campus base for Stanford in Washington, an academic program that combines seminars, tutorials, and internships in the nation’s capital. The center also houses student organizations including the Stanford Volunteer Network, Stanford in Government, the East Palo Alto/Stanford Summer Academy (EPASSA), and the You Can Make A Difference Conference. It administers numerous fellowship programs which provide financial support to students undertaking public and community service work during the summer and post-graduation. Through the center’s school programs, students serve East Palo Alto and Redwood City students as tutors, mentors, teaching assistants, and after school recreation leaders.

Students interested in public and community service internships, study-service connections, community research, volunteer work, and fellowships should visit the Haas Center or call (650) 723-0992.

BOOKSTORE

The Stanford Bookstore, consisting of six branches, is a nonprofit organization, separate from the University, governed by a Board of Directors composed of Stanford faculty, staff, and members of the business community. New and used textbooks and course readers are arranged by department on the Lower Level at the campus Bookstore in White Plaza. Other books, magazines, and study aids are located on all four levels. Apparel, school and office supplies, film and
processing, stationery, souvenirs, a Clinique counter, and a café are on the Upper Level. Services include the shipping of purchases, gift certificates, an ATM machine, book buyback, fax, and the sale of stamps, and one-day campus parking permits. Microdisc, on the Mezzanine Level, meets computer hardware, software, and repair service needs; telephone: 1-800-533-2670.

The Track House Sports Shop at the corner of Campus Drive and Galvez Street sells sports apparel and equipment. Tresidder Express in Tresidder Union offers snack foods, beverages, newspapers, health and beauty aids, and grocery items. The Stanford Bookstore Palo Alto at 135 University Avenue, Palo Alto carries medical, technical, and business books. The University Shop in the Stanford Shopping Center, and the University Shop 2 at 250 University Avenue, Palo Alto, sell Stanford apparel and souvenirs.

OMBUDSPERSON

The original charge for an ombudsperson at Stanford described the purpose of the office in this way: "The Ombudsperson's task is to protect the interests and rights of members of the Stanford community from injustices or abuses of discretion, from gross inefficiency, from unnecessary delay and complication in the administration of University rules and regulations, and from inconsistency, unfairness, unresponsiveness, and prejudice in the individual's experience with University activities. The Ombudsperson's office exists to receive, examine, and channel the complaints and grievances of members of the Stanford community, and to secure expeditious and impartial redress."

Any troublesome matter in the University community may be discussed in confidence with the University Ombudsperson. Services of the office are available to students, staff, and faculty.

Although possessing no decision-making authority, the Ombudsperson has wide powers of inquiry. The Ombudsperson will refer matters to the proper person or office expeditiously and, where appropriate, assist in negotiations. (For the role of the office of the Ombudsperson in cases of sexual harassment, see the "Non-Academic Regulations" section in this bulletin.)

POLICE SERVICES

The Stanford Department of Public Safety, (650) 723-9633, is located at the corner of Campus Drive and Serra Street. It is composed of several divisions:

Deputized Patrol Officers: uniformed officers patrol the campus and respond to calls. They are fully empowered by Santa Clara County and have authority to stop vehicles, make arrests, and enforce all laws. Plain-clothes detectives follow up on cases as necessary.

Community Service Officers (CSOs): enforce parking regulations. The citations they issue for parking violations are payable to Santa Clara County and go to warrant if not paid. The night CSOs check on building security and provide a uniformed presence.

The Special Services Unit (SSU): a campus resource center providing crime prevention and safety awareness programs to the Stanford community. Its free services include pamphlets, videos, and presentations about bicycle safety, earthquake preparedness (earthquake information, 723-0569), personal safety, and property protection. Call 723-0806 to reach the SSU.

"For police, fire, or ambulance response at any time, dial 9-1-1, a free call from all pay phones. From University phones (723-, 725-, 497-, or 498-prefix), dial 9-911. Blue Emergency Phone Towers are now in place across campus for emergency assistance.

For additional safety information, see the Stanford Safety and Security Almanac, which is available from the Special Services Unit of the Stanford Department of Public Safety (723-0806).

CRIME STATISTICS BY CALENDAR YEAR

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† Beginning in 1996, rapes were separated from other forcible offenses.
**Not tabulated prior to 1995. This category includes all incidents that were reported to University officials but not to the police. These victims have chosen not to file police reports. Crimes are reported and posted on the su.etc newsgroup and made available to local newspapers.**

Note: "Forcible Sex Offenses" include forcible rape, forcible sodomy, sexual assault with an object, and forcible fondling. "Nonforcible Sex Offenses" refers to incest and statutory rape (34 Code of Federal Regulations, Part 668, Appendix E).

**STANFORD EVENTS**

All non-academic, non-athletic programs held in University buildings and/or on University property and that are open to the public and/or to students, except for such programs conducted in Tresidder Union or in student residences by students residing in such residences, must be scheduled through the Registrar’s Office on a specific form available from that office. All programs must be approved by Stanford Events.

Organizations that may request use of University facilities for public events include academic departments, administrative offices, organizations recognized by the President’s Office, official organizations of the Associated Students of Stanford University (ASSU), and voluntary student organizations registered with the Office of Student Activities (OSA) and the ASSU and banking with the student-organization fund of the ASSU. Voluntary student organizations sponsoring programs must have the approval of the ASSU student financial manager and the OSA before their requests are presented to the Registrar’s Office for scheduling.

Invitations to individuals not connected with the University to speak or perform at any function, social or otherwise, given by the University and open to the public, are extended only through the President. This ruling does not apply to those meetings at which speakers are invited by faculty to address the students of a class, department, or school, and which are part of the instructional program of the University.

Stanford Events is responsible for the conduct of the Commencement exercises and all other public ceremonies; the approval of University rooms, buildings, outdoor space, and Laurence Frost Amphitheater for public events or meetings; the presentation of a performing arts series (Stanford Lively Arts), and a community outreach program; and managing Visitor Information and the Stanford Ticket Office.

Copies of the Public Events Policy Manual are available from Stanford Events, Press Courtyard, Santa Teresa Street, Stanford, CA 94305-2250.

**SUMMER CONFERENCE SERVICES**

Policies concerning conferences are the responsibility of the President’s and Provost’s Offices. Arrangements for conferences are the responsibility of the Manager of Conferences. Summer Conference Services (650-723-3126) coordinates conferences from June 23 through September 15. Nonacademic Facilities Scheduling in the Registrar’s Office (650) 723-6755 coordinates conferences September 16 through June 22.

A “conference” is any student or adult group that is not a part of a regular or summer academic session for registered students, whether convening for only part of a day (including a luncheon), overnight, or for several days.

Outside organizations wishing to meet at Stanford must have the sponsorship of a University department. Conferences initiated by organizations within or outside the University must be closely related to the academic program of the University. The sponsoring department submits its proposal to the Manager of Conferences for review in terms of available facilities and for approval of the President’s Office.

Arrangements for campus housing and/or meeting room facilities are made with the Manager of Conferences in the Summer Conference Services office, Encina Commons, room 123.

Housing and dining service accommodations in campus residences usually are available on the Sunday following Commencement until August 31. Assistance with arrangements for tables, chairs, audiovisual aids, signs, and other equipment may be made with Summer Conference Services.

**CENTER FOR TEACHING AND LEARNING (CTL)**

Director: Michele Marincovich

“The Center for Teaching and Learning is a University-wide resource on effective teaching for faculty, lecturers, and teaching assistants and on effective learning for undergraduate and graduate students.

**SERVICES TO UNDERGRADUATES AND GRADUATES**

CTL provides a wide range of resources for students who want to enhance their study approaches and clarify their learning strategies. Through formal courses, individual counseling, and outreach programs, CTL helps students build
skills that will be the foundation for continuous improvement and lifelong learning.

Free tutoring is available to undergraduates in most introductory subjects, including writing. Consult the Web page (http://www-ctl.Stanford.edu) for details on where and when tutors can be found. Students interested in, and qualified for, tutoring others can take CTL’s courses on tutoring.

CTL is on the first floor of Sweet Hall, and is open Monday through Friday 9:00 a.m. to 12:00 noon and 1:00 to 5:00 p.m., telephone: (650) 723-1326.

SERVICES TO FACULTY, LECTURERS, AND TEACHING ASSISTANTS

CTL provides the Stanford community with services and resources on effective teaching. Its aims are to: identify and involve successful teachers who are willing to share their talents with others, provide those who are seeking to improve their teaching with the means to do so, acquaint the Stanford community with important innovations and new technologies for teaching, prepare inexperienced teachers for their responsibilities, expand awareness of the role of teaching at research universities, and increase the rewards for superior teaching.

Goals are realized through continuing programs such as: videotaping and consultation; small group evaluation; workshops and lectures; a handbook on teaching and a library of teaching materials; quarterly teaching orientations; and by working with individuals, groups, and departments on their specific needs. CTL offices are on the first floor of Sweet Hall. For further details, see CTL’s teaching handbook or the CTL brochure, both available by calling (650) 723-1326. You can also consult the Web page at http://www-ctl.Stanford.edu.

COURSES

1. Accelerated Learning—Difficult, abstract concepts frequently do not yield their meaning on the basis of repeated rereading. Through the use of various techniques for active learning, it is possible to accelerate the process of conquering difficult concepts while also achieving higher levels of understanding.

   1 unit, Aut, Spr (Staff)

10. Self-Coaching—Through workshops and individual conferences, shows you how you can use lessons from your own experience to be a more successful student, procrastinate less, concentrate more, and read faster.

   1 unit, Aut, Spr (Matthies, Worline)

30. Working Smarter through Precision Questioning—When work is driven by questions, concentration is better, recall is more complete, and motivation improves. Understanding the basic categories of questions and their interrelationships enables us to be more precise, better organized, and more critical.

   2 units, Win (Staff)

40. Reading Faster—Coping with the problem of information overload requires speed reading as it traditionally has been defined and the ability to overview, skim, extract, browse, and navigate through hypertext. To decide what is worth reading, quick and reliable judgments must be made about relevance and credibility.

   1 unit, Aut (Staff)

41. Reading Smarter—In addition to relying on various high-speed gears (CTL 40), expert readers have the ability to shift smoothly into forms of reading that are slower and more reflective. Primary goals of smart reading include: accurate long-term recall, precise interpretation, systematic criticism, idea generation, self-knowledge, and personal growth.

   1 unit, Aut (Staff)

50. Think on your Feet—To be effective in groups, participants must quickly grasp the point being made, the supporting arguments, and the nature of the responses to arguments on the other side of the question. Effective teamwork depends on non-superficial forms of collaboration.

   2 units, Win (Staff)

116. Critical Thinking—Critical thinking encompasses knowing how to find assumptions, recognize ambiguity, evaluate arguments, and judge the credibility of sources of expert opinion. To think critically in one’s daily life and studies requires being comfortable with questions instead of answers, complexity instead of simplicity, uncertainty instead of certainty. These abilities are developed through practical exercises based on contemporary issues and through practice with college-level work from a variety of disciplines. Emphasizes the value of developing a questioning mind and the importance of balancing creativity and reflection.

   3 units, Sum (Staff)

117. The Art of Effective Speaking—Introduction to the principles and practice of effective oral communication. Through formal and informal speaking activities, students develop skills at framing and articulating ideas through speech. Strategies are presented for speaking extemporaneously, preparing and delivering presentations, formulating persuasive arguments, refining critical clarity of thought, and enhancing general facility and confidence at oral self-expression.

   3 units, Aut, Win, Spr (Allen)

118. Public Speaking—A practical approach to the art of public speaking. Emphasis is on developing skills in various speech types: exposition, argumentation, and persuasion. Students sharpen skills with
the aid of textbooks, videotape, texts of famous speeches, and participation in a final program of talks. Students also evaluate presentations by others.

3 units, Sum (Wagstaffe)

119. Teaching Oral Communication—Seminar for students with a rich background in public speaking who wish to train as speech tutors for CTL's Oral Communication Program. Readings, exercises, and supervised teaching refine your speaking skills and prepare you to serve as a peer tutor and consultant in a variety of academic disciplines. Admission by consent of instructor.

3 units, Spr (Allen)

120. Peer Tutor Training—Readings, discussion of videotapes, and individual and group projects. Topics: problem-solving, study skills, effective listening and feedback, cross-cultural sensitivity, and teaching with questions. Short internship required for new tutors.

1 unit, Aut, Win (Staff)

123. Peer Tutoring in Writing—Offered to students who will serve as CTL peer writing tutors. Covers tutoring methods and theory of writing instruction. Students are accepted during Spring Quarter for the following Autumn. Enrollment by consent of instructor and CTL writing tutor program.

2 units, Aut (Staff)

125. Peer Tutoring Practicum—For those who received training in peer tutoring (120 or 123), but who continue to study tutoring methods while tutoring students.

1-2 units, Aut, Win, Spr (Staff)

180. Breakthrough Learning—Drawing on research in cognitive science, human motivation, and developmental psychology, the focus is on a key meta-skill: learning how to learn. Strategies help students construct new learning practices by becoming deeply aware of one's own learning processes. Topics: the art of unlearning, language structure and change; learning styles and the intelligence trap; metacognition; harnessing paradox and intuition; communities of inquiry.

1 unit, Sum (Milojkovic)

219. Oral Communication Workshop for Graduate Students—Addresses a range of graduate student speaking activities such as teaching (delivering lectures, guiding discussion and facilitating small groups), giving professional presentations and conference papers, and preparing for oral or thesis defenses. In-class projects, discussion, and individual evaluation assists students in developing effective techniques for improving oral communication skills.

2 units, Sum (Allen)
turers, teaching fellows, and teaching and course assistants. Ordinarily, awards are made to a senior faculty member (associate or full professor) or senior lecturer; a junior faculty member or member of the teaching staff; a teaching assistant (graduate or undergraduate student). The awards are made annually at the University Commencement Ceremony.

ALLAN COX MEDAL FOR FACULTY EXCELLENCE FOSTERING UNDERGRADUATE RESEARCH

The Allan Cox Medal for Faculty Excellence Fostering Undergraduate Research is awarded annually to a faculty member who has established a record of excellence directing undergraduate research over a number of years of advising to one or two undergraduates who demonstrated superior work. The medal was established in memory of the former professor of Geophysics and Dean of the School of Earth Sciences, a strong supporter of faculty-student research collaboration.

HERBERT HOOVER MEDAL FOR DISTINGUISHED SERVICE

David Starr Jordan's firm belief that every academic degree should represent work actually done in or under the direction of the institution granting it has meant that since its founding, Stanford has awarded no honorary degrees. As a means of recognizing extraordinary individuals who deserve special acknowledgment, the Stanford Alumni Association in 1962 voted to establish the Herbert Hoover Medal for Distinguished Service. The name pays tribute to the former President's example of service to his University, to his country, and to the cause of world humanitarianism. Indeed, Mr. Hoover was the first award recipient. The gold medal is presented following selection by an anonymous committee appointed by the Chair of the Board of Directors of the Alumni Association. There have been 11 honorees.

STUDENT BOOTHE PRIZE FOR EXCELLENCE IN WRITING

Awarded during the freshman year, the Boothe Prize recognizes excellence in writing. Students are selected for this honor on the basis of essays written for courses in the Area One Program and in Writing and Critical Thinking. The prize is named for Mr. and Mrs. D. Power Boothe, Jr., whose gifts to the University reflect their interest in the Humanities.

PRESDENT'S AWARD FOR ACADEMIC EXCELLENCE IN THE FRESHMAN YEAR

The President's Award honors students who have exceptionally distinguished academic records that exemplify a strong program of study in the freshman year. Students eligible for the award normally have completed Writing and Critical Thinking and the Area One Program during their first year at Stanford.

FIRESTONE MEDAL FOR EXCELLENCE IN RESEARCH

The Firestone Medal is awarded to seniors in recognition of excellence in undergraduate research. Departments in the School of Humanities and Sciences nominate students who have completed outstanding honors projects in the social, physical, and natural sciences.

ROBERT M. GOLDEN MEDAL FOR EXCELLENCE IN THE HUMANITIES

The Golden Medal recognizes outstanding achievement in the humanities and the creative arts. Seniors receive these medals upon nomination by their major department.

FREDERICK EMMONS TERMAN ENGINEERING SCHOLASTIC AWARD

The School of Engineering annually presents the Terman Award to seniors for outstanding academic achievement. The awardees share their award with a high school teacher of their nomination.

DEANS' AWARD FOR ACADEMIC ACHIEVEMENT

The deans of Earth Sciences, Engineering, and Humanities and Sciences recognize from five to ten undergraduate students each year for their academic endeavors. Honorees are cited for noteworthy accomplishments which represent more than a high grade point average or success in course work. Faculty nominate students who have exceptional tangible achievements in classes or independent research, national academic competitions, a presentation or publication for a regional or national audience, or exceptional performance in the creative arts.

PHI BETA KAPPA

Phi Beta Kappa is a nationwide society honoring students for the excellence and breadth of their undergraduate scholarly accomplishments. Membership in the Stanford Chapter (Beta of California) is open to undergraduates of all majors. To
be elected to Phi Beta Kappa at Stanford, a student must achieve academic distinction in the major as well as in courses across a broad range of fields.

Approximately a tenth of the members of a graduating class are elected to Phi Beta Kappa. Of this number, about one fifth are chosen in their junior year, the remainder in their senior year.

The chapter’s election guidelines (revised July, 1997*) define “breadth” of study as excellence beyond the major field. To be considered for election, a student must have taken, by the time elections are held early in the Spring Quarter, at least three courses in each of the following three major domains of knowledge: Humanities; Science, Engineering and Math; and Social Sciences. To be considered for election, transfer students must have taken at least two courses at Stanford in each of these major domains.

Examples of courses that satisfy the Phi Beta Kappa breadth criterion include those listed in the Stanford Bulletin for the undergraduate General Education Requirements (GER) in Areas 2 to 4. Courses taken for GER Area 1 are not considered as satisfying the PBK breadth criterion.

A grade of “+” or “CR” is not considered a sign of distinction. Minimally satisfying the “breadth” criterion is not considered a sign of distinction.

The academic records of all students are automatically reviewed, so no special action is required for students wishing to be considered for membership. Anonymity in the election process is ensured by removal of students’ names from their academic records before consideration. Students who desire that their records not be made available for consideration by the Stanford chapter of Phi Beta Kappa should inform the Registrar, room 133, Old Union.

* Seniors graduating in 1997-98 are covered under the old guidelines (see Stanford Bulletin 1996-97).

EXCHANGE PROGRAMS AND CROSS-ENROLLMENT AGREEMENTS

Stanford has exchange programs and cross-enrollment agreements with a number of other colleges and universities. The purpose of these programs and agreements is to offer Stanford students courses and training that are not available in the Stanford curriculum.

EXCHANGE PROGRAMS UNDERGRADUATE

Stanford has exchange programs with four colleges and universities that allow students to take advantage of particular educational opportunities not available on the home campus. The participating institutions are Brown University, University of Chicago, Columbia University, Cornell University, Harvard University, Massachusetts Institute of Technology, Princeton University, University of Pennsylvania, and Yale University. Further information is available at the Undergraduate Advising Center.

CROSS-ENROLLMENT AGREEMENTS FOR ROTC

Stanford has cross-enrollment agreements for the Reserve Officers' Training Corps (ROTC) with the Navy and the Marine Corps ROTC program at the University of California at Berkeley, the Army ROTC program at Santa Clara University, and the Air Force ROTC program at San Jose State University. The purpose of these agreements is to allow Stanford students to engage in military
training while working on their degrees from Stanford. Courses taken in ROTC programs are offered by and through UC Berkeley, Santa Clara, and San Jose State. The course may not be used towards the 12 unit requirement for full-time registration status or satisfactory academic progress requirements for Stanford undergraduates. Certain ROTC courses may be eligible to be used as transfer credit if they qualify under Stanford’s transfer credit practices.

Normally, students who participate in ROTC training complete a four-year course of instruction at the respective institution that consists of two years of basic courses during the freshmen and sophomore years, and an advanced course of instruction during the junior and senior years. Students who accept ROTC scholarships are generally subject to a service obligation, depending on the regulation of the particular service.

Stanford students who are enrolled in ROTC programs under the cross-enrollment agreements are eligible to compete for scholarships to include full tuition and a monthly stipend (Navy and Air Force) or other varying amounts (Army). Students normally compete for national scholarships as high school seniors, although current Stanford students may be eligible to enroll in ROTC on a non-scholarship basis. Non-scholarship ROTC students are eligible to compete for scholarships, and individual services may offer additional scholarship programs to current qualifying undergraduate and graduate students. Interested students should contact the appropriate military professor at the host institution to obtain information on these programs and to initiate application procedures.

Students who satisfactorily complete an ROTC program and are awarded a Stanford degree qualify for a commission as a Second Lieutenant in the U.S. Army, an Ensign in the U.S. Navy, a Second Lieutenant in the U.S. Marines, or a Second Lieutenant in the U.S. Air Force.

For questions concerning the ROTC programs, Stanford students should consult one of the following: Naval ROTC, 152 Hearst Gym, UC-Berkeley, Berkeley CA 94720-3640, telephone (800) 430-3014; Army ROTC, Department of Military Science, Santa Clara University, Santa Clara, CA 95053, telephone (800) 227-7682; Air Force ROTC, San Jose State University, San Jose, CA 95192-0051, telephone (800) 924-2960.

COURSES

AIR FORCE ROTC

The following are offered by San Jose State University:

Introduction to the Air Force Today—Freshman year.
The Air Force Way—Sophomore year.
Field Training—Sophomore year.

Air Force Leadership and Management—Junior year.
National Security Affairs/Preparation for Active Duty—Senior year.
Leadership Laboratory—Senior year. Mandatory and complements the list above. During freshman and sophomore years, includes study of Air Force customs and courtesies, drill and ceremonies, and military commands. During junior and senior year, consists of advanced leadership experiences involving the planning and controlling of military activities of the cadet corps, the preparation and presentation of briefings, and other oral and written communications.

ARMY ROTC

The following are offered by Santa Clara University:

Fundamentals of Leadership and Management—Basic course. First and second year are designed for beginning students who want to qualify for entry into the Advanced Course in a normal progression. Introduces key terms needed to address the leadership challenges and problem-solving methods used in the Advanced Course. Communication skills are taught, practiced, and mastered. This ensures that students entering the Advanced Course are prepared to take charge of groups and organize the activities of the group in problem-solving exercises and labs. Associated extracurricular activities are: the leadership reaction course; a physically challenging confidence course, rappelling, marksmanship, and competitive orienteering.

The following are offered for the Army ROTC Basic Course:

Basic Leadership Development and Communicative Skills—Freshman year.
History of the U.S. Army Military Profession—Freshman year.
Applied Leadership Development—Freshman year.
Organizational Leadership Theory—Sophomore year.
Team Development—Sophomore year.
Troop Leading Procedures/U.S. Army—Sophomore year.

Advanced Leadership and Management—Advanced sophomores. This sequence is open to students who have completed the Basic Course or earned placement credit for it. Placement credit can be achieved through prior military training or completion of the six-week summer course known as Camp Challenge at Fort Knox, KY. Students who want to qualify for the Advanced Course, via Camp Challenge, should plan to attend the camp as early as the summer before their junior year at Stanford.
Students must complete the Advanced Course in the sequence prescribed by the Department of Military Science at Santa Clara University.

The following are offered for the Army ROTC Advanced Course:

**Leading Small Organizations I**—Junior year.

**Leading Small Organizations II**—Junior year.

**Advanced Tactics**—Junior year.

**ROTC Advanced Camp**—Junior year. Six-week summer camp. Open only to contracted students who have completed junior-year courses and who are seeking a commission in the U.S. Army.

**Leadership Challenges and Goal Setting**—Senior year.

**Transition to Lieutenant**—Senior year.

**Precommissioning Seminar**—Senior year.

**NAVAL ROTC**

The Department of Naval Science at UC Berkeley offers programs of instruction for men and women leading to active duty reserve commissions in the U.S. Navy or U.S. Marine Corps. Navy option students enrolled in one of the four-year programs normally complete the following courses during the first two years.

**NS1. Introduction to Naval Science**—Freshman year.

**NS2. Sea Power and Maritime Affairs**—Freshman year.

**NS3. Leadership and Management**—Sophomore year.

**NA10. Ship Systems**—Sophomore year.

Navy option students enrolled in either the four- or two-year program normally complete the following courses during their junior and senior years.

**NS12A. Navigation and Naval Operations I**—Junior year.

**NS12B. Navigation and Naval Operations II**—Junior year.

**NS401. Naval Ship Systems**—Senior year.

**NS412. Leadership and Ethics**—Senior year.

In addition to the above courses, Navy option ROTC students are required to participate in weekly professional development laboratories (drill) at UC Berkeley and complete a number of other courses at Stanford including one year of calculus, physics, and English, and one quarter of computer science, leadership and management, and military history or national security policy.

In lieu of **NS401, NA10, and NS12B**, Marine option students may participate in Marine Seminars and complete MA154, History of Littoral Warfare and MA20, Evolution of American Warfare (or a designated equivalent course). Marine option students also participate in the weekly professional development laboratories.
STATEMENT OF NONDISCRIMINATORY POLICY

Stanford University admits students of either sex and any race, color, religion, sexual orientation, or national and ethnic origin to all the rights, privileges, programs, and activities generally accorded or made available to students at the University. It does not discriminate against students on the basis of sex, race, age, color, disability, religion, sexual orientation, or national and ethnic origin in the administration of its educational policies, admissions policies, scholarships and loan programs, and athletic and other University-administered programs.

AMERICANS WITH DISABILITY ACT/REHABILITATION ACT GRIEVANCE PROCEDURE POLICY

Stanford University, in compliance with state and federal laws and regulations including the Americans with Disabilities Act of 1990 (ADA) and Section 504 of the Rehabilitation Act of 1973 (Section 504), does not discriminate on the basis of disability in administration of its education-related programs and activities and has an institutional commitment to provide equal educational opportunities for disabled students who are otherwise qualified.

Students who believe they have been subjected to discrimination on the basis of disability, or have been denied access to services or accommodations required by law, have the right to use this grievance procedure.

APPLICABILITY

The grievance procedure set forth below is applicable to undergraduate and graduate students of the University. In general, it is designed to address disputes concerning the following:

1. Disagreements regarding a requested service, accommodation, or modification of a University practice or requirement
2. Inaccessibility of a program or activity
3. Harassment or discrimination on the basis of disability
4. Violation of privacy in the context of disability

For disputes regarding certain specific academic accommodations or modification of academic requirements (such as reduction in the number of academic course units taken quarterly or yearly, requests for substitution of courses, or issues relating to academic standing), the alternate procedure set forth in Section V (C) of the Stanford University Policy and Procedure for Student Requests for Services and Accommodations should be followed. For questions regarding which procedure is applicable, contact one of the Compliance Officers at the Office for Multicultural Development.

These two sets of procedures supplant the Guidelines for Student Academic Grievance Procedures (set forth in the Stanford Bulletin) for disability-related grievances.

COMPLIANCE OFFICERS

Stanford University’s Compliance Officers are responsible for administering this grievance procedure as well as ensuring compliance with applicable laws. The designated Compliance Officers are: Rosa Gonzalez (ADA / Section 504 Compliance Officer) and Sally Dickson (Director of the Office for Multicultural Development). They have offices in Building 170 in the Main Quad and may be reached by calling (650) 723-3484, TTY 723-1216, fax 725-3326.

INFORMAL RESOLUTION/SECOND REVIEW

1. Prior to initiating the formal complaint procedure set forth below, and as a prerequisite to it, the student shall contact a Compliance Officer for assistance in resolving the matter informally within seven calendar days of the determination communicated by the DRC (if there was such a determination).

If the Compliance Officer is not successful in quickly achieving a satisfactory resolution (that is, generally within seven calendar days), the Compliance Officer will take the steps described in subparagraph ‘2.’ below.

2. Second Review Panel: in accordance with the dispute resolution procedures outlined in Section VII of the Stanford University Policy and Procedure for Student Requests for Services and Accommodations, the Compliance Officer will convene an ad-hoc second review panel to review the issue(s) raised. The panel will consist of the following (or their designees): the Compliance Officer reviewing the request, the Director of the DRC, the Dean of Students, and (depending upon the issues) such other academic or administrative personnel as may be appropriate. This panel will review the request, investigate, and attempt to resolve the issues within seven calendar days of the request for or initiation of a second review. No formal report need be issued by the panel, but the panel
will document the outcome of its review in a letter to the student. If the student is not satisfied with the panel’s disposition of the matter, the student may file a formal complaint in accordance with the procedure described below.

FORMAL COMPLAINT

If the procedure set forth above for informal resolution does not yield a successful resolution, then the student may file a formal complaint in the following manner:

1. **When to File Complaint:** complaints shall be filed within ten calendar days of the end of the informal resolution process described above.

2. **What to File:** a complaint must be in writing and include the following:
   a) The grievant’s name, address, email address, and phone number
   b) A full description of the problem
   c) A statement of the remedy requested
   d) A copy of the letter from the Second Review Panel setting forth the outcome of the informal grievance procedure described above

3. **Where to File Complaint:** the complaint shall be filed with the Compliance Officer at the Office for Multicultural Development, Building 170, Room 114 (mail code 2040; fax 650-725-3326).

4. **Notice of Receipt:** upon receipt of the complaint, the Compliance Officer reviews the complaint for timeliness and appropriateness for this grievance procedure, and provides the grievant with written notice acknowledging its receipt.

5. **Investigation:** the Compliance Officer or his or her designee (hereafter collectively referred to as the “grievance officer”) shall promptly initiate an investigation. In undertaking the investigation, the grievance officer may interview, consult with and/or request a written response to the issues raised in the grievance from any individual the grievance officer believes to have relevant information, including faculty, staff, and students.

6. **Representation:** the grievant and the party against whom the grievance is directed shall have the right to have a representative. The party shall indicate whether he or she is to be assisted by a representative and, if so, the name of that representative. For purposes of this procedure, an attorney is not an appropriate representative.

7. **Findings and Notification:** upon completion of the investigation, the grievance officer will prepare and transmit to the student, and to the party against whom the grievance is directed, a final report containing a summary of the investigation, written findings, and a proposed disposition. This transmission will be expected within 45 calendar days of the filing of the formal complaint. The deadline may be extended by the Compliance Office for good cause. The final report shall also be provided, where appropriate, to any University officer whose authority will be needed to carry out the proposed disposition or to determine whether any personnel action is appropriate.

8. **Final Disposition:** the disposition proposed by the grievance officer shall be put into effect promptly. The grievant or any party against whom the grievance or the proposed disposition is directed may appeal. The appeal to the Provost (as set forth below) will not suspend the implementation of the disposition proposed by the grievance officer, except in those circumstances where the Provost decides that good cause exists making the suspension of implementation appropriate.

**URGENT MATTERS**

Whenever the application of any of the time deadlines or procedures set forth in this grievance procedure creates a problem due to the nature of the complaint, the urgency of the matter, or the proximity of the upcoming event, the Compliance Officer will, at the request of the grievant, determine whether an appropriate expedited procedure can be fashioned.

**REMEDIES**

Possible remedies under this grievance procedure include corrective steps, actions to reverse the effects of discrimination or to end harassment, and measures to provide a reasonable accommodation or proper ongoing treatment. As stated above, a copy of the grievance officer’s report may, where appropriate, be sent to University officer(s) to determine whether any personnel action should be pursued.

**APPEAL**

Within ten calendar days of the issuance of the final report, the grievant or the party against whom the grievance is directed may appeal to the Provost the grievance officer’s determination. An appeal is taken by filing a written request for review with one of the Compliance Officers at the Office for Multicultural Development, Building 170, Room 114 (mail code 2040; fax 650-725-3326).

The written request for review must specify the particular substantive and/or procedural basis for the appeal, and must be made on grounds other than general dissatisfaction with the proposed disposition. Furthermore, the appeal must be directed only to issues raised in the formal complaint as filed or to procedural errors in the conduct of the grievance procedure itself, and not to new issues.

The Compliance Officer shall forward the appeal to the Provost, and also provide copies to
the other party or parties. The review by the Provost or his or her designee normally shall be limited to the following considerations:

1. Were the proper facts and criteria brought to bear on the decision or, conversely, were improper or extraneous criteria brought to bear on the decision?
2. Were there any procedural irregularities that substantially affected the outcome?
3. Given the proper facts, criteria, and procedure, was the decision a reasonable one?

A copy of the Provost’s written decision will be expected within 30 calendar days of the filing of the appeal and shall be sent to the parties, the Compliance Officer and, if appropriate, to the University officer whose authority will be needed to carry out the disposition. The deadline may be extended by the Provost for good cause. The decision of the Provost on the appeal is final.

POLICY REVIEW AND EVALUATION

This grievance procedure took effect on September 23, 1996. After it has been in place for two years, the Provost will initiate a review process to evaluate it and make recommendations for any improvements.

TITLE IX OF THE EDUCATION AMENDMENTS OF 1972

It is the policy of Stanford University to comply with Title IX of the Education Amendments of 1972 and its regulations, which prohibit discrimination on the basis of sex. Sally Dickson, Director of the Office of Multicultural Development, has been appointed to coordinate the University’s efforts to comply with the law. Anyone who believes that, in some respect, Stanford is not in compliance with Title IX and its regulations should contact Ms. Dickson at (650) 723-3484.

COPYING PRINTED MATERIAL FOR TEACHING AND RESEARCH

Federal copyright law governs copying intellectual property such as books and articles, including the making of copies for teaching and research. It is each faculty member’s responsibility to be aware of and abide by the law, and the Provost’s Office periodically issues memoranda reminding faculty and staff members of their responsibilities in this area.

The memoranda, in addition, list those publishers with whom Stanford has an experimental photocopying license that permits Stanford faculty, staff, and students to make as many copies as they need of excerpts of any length (but not an entire book or issue of a periodical) in connection with the educational, research, or administrative functions of the University. For the most current information on this subject, faculty members should consult their department chair or the Provost’s Office.

DOMESTIC PARTNERS

In October 1990, Stanford University adopted a domestic partners policy. This policy, which implements the University’s nondiscrimination policy, makes services that have historically been available to married students available on an equal basis to students with same-sex or opposite-sex domestic partners. These services include access to student housing, a courtesy card that provides access to University facilities, and the ability to purchase medical care at Cowell Health Service. A domestic partnership is defined as an established long-term partnership with an exclusive mutual commitment in which the partners share the necessities of life and ongoing responsibility for their common welfare.

SEXUAL HARASSMENT

What follows is a summary of the University’s Sexual Harassment Policy, which is published in its complete form in the Administrative Guide.

POLICY

Stanford University strives to provide a place of work and study free of sexual harassment, intimidation, or exploitation. It is expected that students, faculty, and staff will treat one another with respect.

All students, faculty, and staff are subject to this policy. Individuals who violate this policy are subject to discipline up to and including discharge, expulsion, or other appropriate sanction.

Reports of sexual harassment are taken seriously and will be dealt with promptly. The specific action taken in any particular case depends on the nature and gravity of the conduct reported, and may include intervention, mediation, investigation, and the initiation of grievance and disciplinary processes as discussed more fully below. Where sexual harassment is found to have occurred, the University will act to stop the harassment, act to prevent its recurrence, and discipline those responsible.

The University recognizes that confidentiality is important. Sexual harassment advisers and others responsible to implement this policy will respect the confidentiality and privacy of individuals reporting or accused of sexual harassment to the extent reasonably possible. Examples of situations where confidentiality cannot be maintained include circumstances when the University is required by law to disclose information (such as in response to legal process) and when disclosure is required by the University’s out-
weighing interest in protecting the rights of others.

Reprisals against an individual who in good faith reports or provides information in an investigation about behavior that may violate this policy are against the law and will not be tolerated. Intentionally providing false information, however, is grounds for discipline.

Stanford is committed to the principles of free inquiry and free expression. Vigorous discussion and debate are fundamental to the University, and this policy is not intended to stifle teaching methods or freedom of expression generally, nor will it be permitted to do so. Sexual harassment, however, is neither legally protected expression nor the proper exercise of academic freedom; it compromises the integrity of the University, its tradition of intellectual freedom and the trust placed in its members.

WHAT IS SEXUAL HARASSMENT?

Unwelcome sexual advances, requests for sexual favors, and other visual, verbal, or physical conduct of a sexual nature constitute sexual harassment when:

1. It is implicitly or explicitly suggested that submission to or rejection of the conduct will be a factor in academic or employment decisions or evaluations, or permission to participate in a University activity;

or

2. The conduct has the purpose or effect of unreasonably interfering with an individual’s academic or work performance or creating an intimidating or hostile academic, work, or student living environment.

“Determining what constitutes sexual harassment depends upon the specific facts and the context in which the conduct occurs. Sexual harassment may take many forms—subtle and indirect, or blatant and overt. For example,

It may be conduct toward an individual of the opposite sex or the same sex.

It may occur between peers or between individuals in a hierarchical relationship.

It may be aimed at coercing an individual to participate in an unwanted sexual relationship or it may have the effect of causing an individual to change behavior or work performance.

It may consist of repeated actions or may even arise from a single incident if sufficiently egregious.

“The University’s Policy on Sexual Assault (see Stanford Administrative Guide Memo 23.3) may also apply when sexual harassment involves physical contact.

WHAT TO DO ABOUT SEXUAL HARASSMENT

The following are the primary methods for dealing with sexual harassment at Stanford. They are not required to be followed in any specific order. However, early informal methods are often effective in correcting questionable behavior.

CONSULTATION

Consultation about sexual harassment is available from the Sexual Harassment Advisers (including residence deans), human resources personnel, counselors at Counseling and Psychological Services (CAPS) or the Help Center, chaplains at Memorial Church, ombudspersons, and others. A list of Sexual Harassment Advisers is available in the brochure, Understanding Stanford’s Sexual Harassment Policy. The brochure can be obtained from the Office of the Sexual Harassment Coordinating Adviser, 1000 Welch Road, Room 301, Palo Alto, CA 94304, (650) 723-1583. The information contained in the brochure, including an up-to-date list of Sexual Harassment Advisers, is available online at http://www-leland.stanford.edu/group/SexHarass. Consultation is available for anyone who wants to discuss issues related to sexual harassment, whether or not “harassment” actually has occurred, and whether the person seeking information is a complainant, a person who believes his or her own actions may be the subject of criticism (even if unwarranted), or a third party.

Often there is a desire that a consultation be confidential or “off the record.” This can usually be achieved when individuals discuss concerns about sexual harassment without identifying the other persons involved, and sometimes even without identifying themselves. Confidential consultations about sexual harassment also may be available from persons who, by law, have special professional status, such as counselors at Counseling and Psychological Services (CAPS) or the Help Center, chaplains at Memorial Church, and University and Medical Center ombudspersons. In these latter cases, the level of confidentiality depends on what legal protections are held by specific persons receiving the information and should be addressed with them before specific facts are disclosed.

DIRECT COMMUNICATION

An individual may act on concerns about sexual harassment directly, by addressing the other party in person or writing a letter describing the unwelcome behavior and its effect and stating that the behavior must stop. A Sexual Harassment Adviser can help the individual plan what to say or write, and likewise can counsel persons who receive such communications. Reprisals against
an individual, who in good faith initiates such a communication, violate this policy.

THIRD PARTY INTERVENTION

Depending on the circumstances, third party intervention in the workplace, student residence, or academic setting may be attempted. Third party intereners may be the Sexual Harassment Advisers, human resources professionals, the ombudspersons, other faculty or staff, or sometimes mediators unrelated to the University.

When third party intervention is used, typically the third party will meet privately with each of the persons involved, try to clarify their perceptions, and attempt to develop a mutually acceptable understanding that can insure that the parties are comfortable with their future interactions. Other processes, such as a mediated discussion among the parties or with a supervisor, may also be explored in appropriate cases.

Possible outcomes of third party intervention include explicit agreements about future conduct, changes in workplace assignments, substitution of one class for another, or other relief, where appropriate.

FORMAL GRIEVANCE AND DISCIPLINARY PROCESSES

Grievance or disciplinary processes may be pursued as applicable.

The applicable grievance procedure depends on the circumstances and the status of the person bringing the charge and the person against whom the charge is brought. Generally, the process consists of the grievant's submission of a written statement, an investigation by a University representative, followed by a decision and, in some cases, the possibility of one or more appeals, usually to Stanford administrative officers at higher levels. The relevant procedure (see below) should be read carefully, since the procedures vary considerably.

If the identified grievance officer has a conflict of interest, an alternate will be arranged, and the Sexual Harassment Coordinating Adviser can help assure that this occurs.

In most cases, grievances must be brought within a specified time after the action complained of. While informal resolution efforts will not automatically extend the time limits for filing a grievance, in appropriate circumstances the complainant and the other relevant parties may mutually agree in writing to extend the time for filing a grievance.

The following are the established grievance procedures; copies may be obtained from the Office of the Sexual Harassment Coordinating Adviser:

Staff Grievance Procedure (see Stanford Administrative Guide Memo 22.10)

Collective Bargaining Agreements for unit members

Academic Staff Grievance Procedure (see Research Policy Handbook)

Faculty Grievance Procedure (see Faculty Handbook)

Student Academic Grievance Procedure (see Stanford University Bulletin, Information and Regulations Governing Student Conduct and Procedures for their Enforcement)

Student Employee Grievance Procedure (see Stanford Administrative Guide Memo 24)

Student Nonacademic Grievance Procedure pursuant to Title IX (for additional information, consult the Director of the Office for Multicultural Development, who serves as the University’s Title IX Officer)

"In appropriate cases, disciplinary procedures may be pursued. The applicable disciplinary procedure depends on the status of the individual whose conduct is in question. For example, faculty are subject to the Statement on Faculty Discipline and students to the Fundamental Standard.

PROCEDURAL MATTERS

INVESTIGATIONS

If significant facts are contested, an investigation may be undertaken. The investigation will be conducted in a way that respects, to the extent possible, the privacy of all of the persons involved. In appropriate cases, professional investigators may be asked to assist in the investigation. The results of the investigation may be used in the third party intervention process or in a grievance or disciplinary action.

RECORDKEEPING

The Sexual Harassment Coordinating Adviser will track reports of sexual harassment for statistical purposes and report at least annually to the University President concerning their number, nature, and disposition.

In the other instances (third party intervention, grievances, and disciplinary actions), the Sexual Harassment Coordinating Adviser may keep confidential records of reports of sexual harassment and the actions taken in response to those reports, and use them to identify individuals or departments likely to benefit from training so that training priorities can be established. No records will be retained in cases where the individual accused was not informed that there was a complaint.

COSTS

California law provides, in part, "an employer shall indemnify its employee for all that the employee necessarily expends or loses in direct consequence of the discharge of his or her duties as such ...." The issue of indemnification obvi-
Sexual harassment is prohibited by state and federal law. In addition to the internal resources described above, individuals may pursue complaints directly with the government agencies that deal with unlawful harassment and discrimination claims, for example, the U.S. Equal Employment Opportunity Commission (EEOC), the Office for Civil Rights (OCR) of the U.S. Department of Education, and the State of California Department of Fair Employment and Housing (DFEH). These agencies are listed in the Government section of the telephone book.

NOTE ON CONSENSUAL RELATIONSHIPS

There are special risks in any sexual or romantic relationship between individuals in inherently unequal positions (such as teacher and student, supervisor and employee, or student resident and the individual who supervises the day-to-day student living environment). Parties in such a relationship assume those risks. Such relationships may undermine the real or perceived integrity of the supervision and evaluation provided, and the trust inherent particularly in the student-faculty relationship. They may, moreover, be less consensual than the individual whose position confers power believes. The relationship is likely to be perceived in different ways by each of the parties to it, especially in retrospect.

Moreover, such relationships may harm or injure others in the academic or work environment. Relationships in which one party is in a position to review the work or influence the career of the other may provide grounds for complaint when that relationship gives undue access or advantage, restricts opportunities, or creates a hostile environment for others. Furthermore, circumstances may change, and conduct that was previouslywelcome may become unwelcome. Even when both parties have consented at the outset to a romantic involvement, this past consent does not remove grounds for a charge based upon subsequent unwelcome conduct.

POLICY REVIEW AND EVALUATION

This policy went into effect on October 6, 1993, and was amended on November 30, 1995. It is subject to periodic review, and any comments or suggestions should be forwarded to the Sexual Harassment Coordinating Adviser.

POLICY REFERENCE

Stanford’s Sexual Harassment policy is published in its entirety as Administrative Guide Memo 23.2. The Administrative Guide is a public document available for review with local personnel administrators, at any Personnel Office, and at the reference desk in Green Library, and on-line in Portfolio in the Office category.
RESOURCES

A brochure containing the policy, a list of current sexual harassment advisers, confidential resources, and other helpful information is available on-line at http://www.leland.stanford.edu/group/SexHarass/, and in printed form from the Office of the Sexual Harassment Coordinating Adviser (650) 723-1583, 1000 Welch Rd., Room 301, MC 0146. Copies of the University policy on sexual assault, which complements this sexual harassment policy, as well as all other documents mentioned in this section, are also available at the Coordinating Adviser’s office,

All faculty, staff, and students who have questions regarding this policy and its enforcement can consult with a Sexual Harassment Adviser or can be directed to the local Personnel Officer or Employee Relations Representative. Faculty members should contact their dean or department chair, and students should contact the Vice Provost of Student Affairs.

Sexual Harassment Policy Coordinating Office—

Laraine Zappert, Coordinating Adviser, Clinical Associate Professor, Psychiatry and Behavioral Sciences, Tel: (650) 327-8259; 723-1583, E-mail: Harass@leland.stanford.edu
Virginia Pollard, Administrative Associate, Tel: 723-1583, E-mail: vpollard@leland

POLICY ON SEXUAL ASSAULT

What follows is a summary of the University’s Policy on Sexual Assault.

Background—Stanford University’s policy and procedures on sexual harassment are published in Administrative Guide Memo 23.2 and are re-published annually in the Stanford Bulletin and elsewhere. This statement supplements them, providing Stanford University’s policy and procedures specifically concerning sexual assault. This statement has been enacted by Stanford University in accordance with California State Law, Assembly Bill 3098, Postsecondary Education: Student Safety, July, 1990.

Definition—For the purposes of this statement by the University, “sexual assault” includes, but is not limited to, rape, forced sodomy, forced oral copulation, rape by a foreign object, sexual battery, or threat of sexual assault.

Policy—Sexual assault by force or coercion, including deliberate coercion through the use of drugs or alcohol, is absolutely unacceptable at Stanford University. Any member of the Stanford community who commits sexual assault at or on the grounds of the University, or at any of the University’s off-campus facilities or activities, or at the facilities or activities of any affiliated student organization, will face maximal institutional sanctions, in addition to any prosecutions external authorities may undertake. Stanford University is committed to providing information on services, resources, and treatment available to victims of sexual assault.

Notification—With the consent of the victim, charges of sexual assault received by University offices or personnel shall be communicated promptly to the Department of Public Safety, 711 Serra Street, telephone (9)-911 for emergency response or (650) 723-9633 during normal business hours, or, in the case of a student, to the sexual assault response team at Counseling and Psychological Services (CAPS) at Cowell Student Health Center, 606 Campus Drive, telephone 723-3785.

Legal Reporting Requirements—Health care professionals are expected to fulfill legally mandated reporting requirements.

Emergency Services Available to Victims—Victims of sexual assault are urged to seek immediate attention from emergency police, medical, and counseling services. On the Stanford campus and in the immediate vicinity, the following provide 24-hour response and will arrange for police assistance, medical assistance, emotional support services, and advocacy and support:

“911” Emergency Network: dial 9-911 from University phones or 911 from outside phones.
Santa Clara Valley Medical Center, 751 South Bascom Avenue, San Jose, telephone (408) 299-5311.
Mid-Peninsula Rape Crisis Center, 4161 Alma Street, Palo Alto, telephone (650) 493-RAPE.
Sexual Assault Response Team (CSART), for students, at the Cowell Student Health Center, telephone 723-3785.
Stanford University Hospital, 300 Pasteur Drive, Stanford, telephone 723-5111.

Non-Emergency Resources—Additional resources for students are available at Cowell Student Health Center (650-723-3785) including short-term counseling, referral to long-term therapy, follow-up pregnancy testing, and testing and treatment for sexually transmitted diseases. Additional services for faculty and staff are available at the University’s HELP Center, Galvez House (723-4577), including general counseling, information, support, and referral. The University ombudsperson (723-6494) is available to all in the Stanford community for general counseling, advice, and advocacy.

Ongoing Case Management Procedures—Both informal procedures and formal grievance procedures for case management of sexual assault charges are given in the University’s policy on Sexual Harassment appearing as Administrative Guide Memo 23.2 and published annually in the Stanford Bulletin. Victims are to be kept informed by...
those responsible for those procedures of the status of any disciplinary action or appeal, providing that the victim agrees in writing, to treat this information as confidential. The offices of the Dean of Students are available to help student victims deal with academic difficulties that may arise because of the victimization and its impact.

Information Requests and Confidentiality—The University offices responding to charges of sexual assault have established protocols for protecting confidentiality and for handling inquiries from the press, concerned students, and parents.

Information about Options—The University officers responding to charges of sexual assault will inform victims, at a minimum, of the options of: criminal prosecution, civil prosecution, the disciplinary process, the appropriate grievance procedure, the availability of mediation, alternative housing assignments, and academic assistance alternatives.

CAMPUS DISRUPTION

What follows is a summary of the University’s policy on campus disruption, which is published in its complete form in the Administrative Guide.

Because the rights of free speech and peaceable assembly are fundamental to the democratic process, Stanford firmly supports the rights of all members of the University community to express their views or to protest against actions and opinions with which they disagree.

All members of the University also share a concurrent obligation to maintain on the campus an atmosphere conducive to scholarly pursuits, to preserve the dignity and seriousness of University ceremonies and public exercises, and to respect the rights of all individuals.

The following regulations are intended to reconcile these objectives.

It is a violation of University policy for a member of the faculty, staff, or student body to (1) prevent or disrupt the effective carrying out of a University function or approved activity, such as lectures, meetings, interviews, ceremonies, the conduct of University business in a University office, and public events; (2) obstruct the legitimate movement of any person about the campus or in any University building or facility.

Members of the faculty, staff, and student body have an obligation to leave a University building or facility when asked to do so in the furtherance of the above regulations by a member of the University community acting in an official role and identifying himself or herself as such; members of the faculty, staff, or student body also have an obligation to identify themselves, when requested to do so by a member of the University community who has reasonable grounds to believe that the person(s) has violated section (1) or (2) of this policy and who has so informed the person(s).

“The policy has been applied to the following actions: refusal to leave a building which has been declared closed; obstructing the passage into or out of buildings by sitting in front of doorways; preventing University employees from entering their workplace; preventing members of a class from hearing a lecture or taking an examination, or preventing the instructor from giving a lecture, by means of shouts, interruptions, or chants; preventing others from hearing a scheduled speaker by means of shouts, interruptions, or chants; refusing to leave a closed meeting when unauthorized to attend; and intruding upon or refusing to leave a private interview.

It should be understood that while the above are examples of extraordinarily disruptive behavior, the application of the policy also takes situational factors into consideration. Thus, for example, conduct appropriate at a political rally might constitute a violation of the Policy on Campus Disruption if it occurred within a classroom.

There is no “ordinary” penalty which attaches to violations of the Policy on Campus Disruption. In the past, infractions have led to penalties ranging from censure to expulsion. In each case, the gravity of the offense and the prior conduct of the student are considered; however, the more serious the offense, the less it matters that a student had otherwise not done wrong.

PROHIBITION OF THE POSSESSION OF DANGEROUS WEAPONS ON CAMPUS

What follows is a summary of the University’s policy on campus disruption, which is published in its complete form in the Administrative Guide.

A. Except for authorized academic purposes, the knowingly possession by any student on any Stanford campus of the following is prohibited: firearms, explosives, or any instrument or weapon of the kind commonly known as blackjack, slingshot, billy club, sandclub, sandbag, or metal knuckles.

B. Notwithstanding paragraph (A) above, a student who is a resident of a Stanford campus may store a weapon on such campus if both of the following conditions are met:
1) The student has complied with all state and federal regulations regarding the use and possession of said weapon, or, in the case of a foreign campus, the laws of the country in which the campus is located.
2) The student stores such weapons with the Stanford Department of Public Safety (SDPS) or, in the case of a foreign campus, in a
facility provided by the director of such campus.

C. Students may remove their weapons from storage only in accordance with regulations established by the SDPS or by the director of the foreign campus at which the weapon is stored. A student who is a resident of a Stanford campus may bring any of the above weapons on campus for purposes of storage only if the student has previously notified the SDPS of the intention to do so, but in no event more than six hours after arrival on the campus. When the student removes the weapon from storage, it must be taken off campus as soon as is practicable, but in no event more than one hour after such removal.

D. The term "Stanford campus" shall include all the lands and facilities of Leland Stanford Jr. University, whether owned or leased, and whether located in the United States or abroad.

CONTROLLED SUBSTANCES AND ALCOHOL

What follows is a summary of the University's policy on controlled substances and alcohol which is published in its complete form in the Administrative Guide.

INTRODUCTION

Student conduct is guided by the Fundamental Standard, which states the expectation that students will act in ways that demonstrate respect for order, morality, personal honor, and the rights of others. Implicit in the Standard is the understanding that students are responsible for making their own decisions and accepting the consequences of those decisions.

In order to make informed decisions about alcohol and other drug use, students should educate themselves about the health and safety risks associated with their use, as well as about state and local laws on possessing, serving, and consuming alcohol. It is widely recognized that the misuse and abuse of drugs ("controlled substances") and the abuse of alcohol are major contributors to serious health problems, as well as to social and civic concerns. Among the health risks associated with the use of illicit drugs and the abuse of alcohol are various deleterious physical and mental consequences including dependency, severe disability—even death. Information concerning the known effects of alcohol and specific drugs is available from the Alcohol and Other Drug Abuse Prevention Program at Cowell Student Health Service.

The goal of this Policy is to reduce the abuse and illegal use of alcohol and other drugs, and the human and material costs associated with it. The University, as an educational institution, approaches student conduct issues from a perspective that places emphasis on individual responsibility and development. Education about and prevention of alcohol and other drug-related problems will continue to be the primary emphasis and goal. However, the University expects students, as individuals and as members of groups, to conduct themselves in accordance with this and all other University policies governing student conduct.

* Controlled substances are those defined in 21 U.S.C. 812; they include, but are not limited to, such substances as marijuana, heroin, cocaine, and amphetamines.

POLICY

It is the policy of the University to maintain a drug-free workplace and campus. The unlawful manufacture, distribution, dispensation, possession, and/or use of controlled substances or the unlawful possession, use, or distribution of alcohol is prohibited on the Stanford campus, in the workplace, or as part of any of the University's activities. The workplace and campus are presumed to include all Stanford premises where the activities of the University are conducted. Violation of this policy may result in disciplinary sanctions up to and including termination of employment or expulsion of students. Violations may also be referred to the appropriate authorities for prosecution. This policy will be reviewed at least biennially.

The University will continue to comply with all applicable state and federal laws, including the Americans with Disabilities Act.

SOME APPLICATIONS

No University funds or funds collected by the University may be used in a way which violates the policy. In student residences, house funds (funds collected by the University) may not be used to buy alcohol that is then served to persons under the age of 21. Therefore, because the majority of freshmen are under 21, house funds for all-freshman residences should not be used to buy alcohol. In other residences, the decision to use student-collected or house funds to buy alcohol should be made thoughtfully, fairly, lawfully, and in a way that respects the views of the students.

Party planners are responsible for planning and carrying out events in compliance with this Policy. At least one house or organization officer must assume responsibility for an event's compliance with the Policy, and their names must be made available to Stanford's Department of Public Safety and the University upon request.

CONSEQUENCES OF VIOLATION

Educational and rehabilitative measures will be the preferred response to infractions of the Policy unaccompanied by more egregious misconduct. Penalties are calibrated according to the
severity of the violation. Misbehavior associated with drug or alcohol use and abuse may result in one or more of the following University consequences:

Individuals who violate the University Residence Agreement may lose their University student housing privileges.

Individuals who violate the University’s terms and conditions for student organization recognition as defined in the Student Organization Handbook may be subject to expulsion from the student organization.

Student groups which violate the Policy may face suspension of social privileges, as well as the loss of University recognition, meeting space, and housing or other related privileges.

Individual students who violate the Fundamental Standard may be subject to the University’s student judicial process.

“Students should understand that inebriation is never an excuse for misconduct, that the careless or willful reduction, through the use of alcohol or other intoxicants, of their own ability to think clearly, exercise good judgment, and respond to rational intervention may invoke more stringent penalties than otherwise might be levied.

Penalties will be imposed according to the facts and circumstances of each case. They can be imposed singly or in combination by the Office of Residential Education/Graduate Residences, the Office of Student Activities, the Dean of Students Office, and the Office of Judicial Affairs.

CIVIL LIABILITY

While the law regarding civil liability is complex, it is important to know that under some circumstances party hosts, sponsors, bartenders, or others might be held legally liable for the consequences of serving alcohol to underage drinkers or to obviously intoxicated persons. Social hosts or party planners could be sued and found personally responsible for damages to the injured party(ies) including:

Specific damages. These are damages which are measurable. For example, when bodily injury results in medical expenses or lost wages.

General damages. These are damages which cannot be specifically measured in terms of dollar amount. For example pain and suffering resulting from bodily injury.

Punitive damages. These are damages which are intended to serve as an example to others and to discourage behavior which is deemed highly undesirable to society.

CRIMINAL LIABILITY

Stanford University is not a sanctuary from the enforcement of state and local laws. Students and others on campus who violate the law may be and have been arrested and prosecuted. Primary responsibility for law enforcement, including that related to alcohol, rests with law enforcement agencies, primarily the Stanford Police Department. Uniformed officers who patrol the campus and respond to calls are deputized by the Sheriff of Santa Clara County and are fully empowered and authorized to stop vehicles, make arrests, and enforce all laws. Laws are subject to change; consequently, the following information is illustrative but must not be relied on as a complete and current citing of relevant laws. More information is available at the Stanford Department of Public Safety, 711 Serra Street.

Generally, as of January, 1997, it is a criminal offense:

1. To provide any alcoholic beverage to a person under 21 (California Business and Professions Code 25658).

2. To provide any alcoholic beverage to an obviously intoxicated person (California Business and Professions Code 25602).

3. For any person under age 21 to purchase alcohol (California Business and Professions Code 25628).

4. To be under the influence of alcohol or another drug in a public place and unable to exercise care for one’s own safety or that of others (California Penal Code 647(f)).

5. For persons under 21 to possess alcohol in any public place or any place open to the public (e.g., public places in student residences) (Business and Professions Code 25662).

6. To operate a motor vehicle while under the influence of alcohol or any other drug. Presumed to be driving under the influence (DUI) with a blood alcohol level (BAL) of 0.08% or higher. Can be shown to be DUI with a BAL of 0.05% or higher (California Vehicle Code 23152).

7. For people under the age of 21 to drive with a BAL of 0.01% or greater (California Vehicle Code 23136 and 23137).

8. For people under the age of 21 to drive with a BAL of 0.05% or greater (California Vehicle Code 23140).

9. To operate a motor vehicle while under the influence of alcohol or any drug and cause injury to another (California Vehicle Code 23153).

10. To ride a bicycle while under the influence of alcohol, drugs, or both (California Vehicle Code 21200.5)

11. To have an open container of alcohol in a motor vehicle; and, for persons under 21 to drive a vehicle carrying alcohol or to possess alcohol while in a motor vehicle (California Vehicle Code 23223, 23221).

12. To have in one’s possession, or to use, false evidence of age and identity to purchase alcohol (California Business and Professions Code 25661).
13. To manufacture a fraudulent driver's license or identification (California Penal Code 470).
14. To possess an open container of alcohol in a public place or any place open to the public. Applies in Palo Alto jurisdiction (Business and Professions Code 25620).
15. To be in possession of an unregistered keg. All kegs sold must be registered at the time of purchase. Identification tags must be placed on all kegs in order to allow kegs to be traced if the contents are used in violation of the law (Business and Professions Code 25659.5).
16. Rape. To have sex with a person who is unable to provide informed consent e.g., under the influence of alcohol or another drug or unconscious (passed out) (California Penal Code 261).
17. To unlawfully possess certain controlled substances, including Rohypnol, amphetamines, certain hallucinogens, depressants, and designer drugs (California Health and Safety Code 11377).
18. To illegally manufacture, sell, distribute, or possess controlled substances (those listed in Schedules I through V of the Controlled Substances Act) (21SC812; 21SC828, 841, 844, 845, 845A).
20. To transport, sell, or distribute marijuana to a minor or to use a minor to transport, sell, or distribute marijuana (California Health and Safety 11361).

WHERE TO GET HELP

In the event of a life threatening emergencies call 9-911 from on-campus and 911 from off-campus.

Campus Resources—(Area Code 650.) Counseling and Psychological Services, 24 hours (723-3785); The Alcohol and Other Drug Prevention Program (723-3429); Stanford Alcohol and Drug Treatment Center (723-6682); Cowell Student Health Center's Medical Advice Line, 24 hours (723-4841); Campus Ministries (723-3114); The Bridge, 24-hour Peer Counseling (723-3392).

The Alcohol and Other Drug Abuse Prevention Program at Cowell: provides information and referral, educational trainings and workshops, and non-clinical consultations for groups and individuals. The Program utilizes a harm reduction approach to prevent problems associated with the use of alcohol, tobacco and other drug (723-3429).

The Office of Student Activities at Tresidder Memorial Union: provides workshops and trainings, publications, and party planning consultations. Web site: http://www-leland.stanford.edu/dept/OSA/party/ (723-2733).

Community Resources—The National Council for Alcoholism and Drug Dependency, 24-hour hotline (408) 292-9945, Alcoholics Anonymous (650) 573-6811 or (408) 297-3555, Al-Anon (650) 873-2356 or (408) 379-1051, Cocaine Anonymous (800) 234-0420 or (408) 374-8009, Narcotics Anonymous (650) 572-3257 or (408) 298-4200.

SMOKE-FREE ENVIRONMENT

What follows is a summary of the University's policy on a smoke-free environment, which is published in its complete form in the Administrative Guide.

Policy—It is the policy of Stanford University that smoking of tobacco products in enclosed buildings and facilities and during indoor or outdoor events (and the selling of tobacco products) on the campus is prohibited. Subject to renegotiations, the University will comply with any current lease agreement permitting the sale of tobacco products on the campus.

Applicability—This policy applies to all academic and administrative units of Stanford University, including SLAC, and all Residence Halls. This policy does not supercede more restrictive policies which may be in force in compliance with federal, state, or local laws or ordinances. The policy was effective in the Residence Halls and other campus student housing locations at the beginning of the 1994-1995 academic year.

Guidelines—Smoking is prohibited in classrooms and offices, all enclosed buildings and facilities, in covered walkways, in University vehicles, during indoor and outdoor athletic events, and during other University sponsored or designated indoor or outdoor events.

Ashtrays will not be provided in any enclosed University building or facility. Tobacco products will not be sold at the University. "Smoking Prohibited" signs will be posted.

Smoking is permitted in outdoor areas, except during organized events. Outdoor smoking areas should be located far enough away from doorways, open windows, covered walkways, and ventilation systems to prevent smoke from entering enclosed buildings and facilities. To accommodate faculty, staff, and students who smoke, Vice Presidents, Vice Provosts, and Deans may designate certain areas of existing courtyards and patios as smoking areas in which case ashtrays must be provided. Costs associated with providing designated smoking areas and ashtrays will be absorbed by the specific academic or administrative unit(s).

Enforcement—This policy relies on the consideration and cooperation of smokers and non-smokers. It is the responsibility of all members of the University community to observe and follow this policy and its guidelines.

Smoking cessation programs are available for faculty and staff through the Center for Research
in Disease Prevention, and the Health Improvement Program (HIP). Students may contact the Health Promotion Program (HPP) through the Student Health Center for smoking cessation information or programs.

Faculty, staff, and students repeatedly violating this policy may be subject to appropriate action to correct any violation(s) and prevent future occurrences.

Implementation and Distribution—Copies of this policy will be disseminated by the Vice President for Faculty and Staff Services, and the Vice Provost for Student Affairs to all faculty, staff, and students and to all new members of the University community.

UNIVERSITY STATEMENT ON PRIVACY

Stanford University has an interest in ensuring that the privacy of its students, faculty, and staff is respected, and that no activities interfere with education, research, or residential life.

The University is private property; however, some areas of the campus typically are open to visitors. These areas include White Plaza, public eating areas (such as those at Tressider Union), outdoor touring areas, and locations to which the public has been invited by advertised notice (such as for public educational, cultural, or athletic events). Even in these locations, visitors must not interfere with the privacy of students, faculty, and staff, or with educational, research, and residential activities. The University may revoke at any time permission to be present in these, or any other areas. Visitors should not be in academic or residential areas unless they have been invited for appropriate business or social purposes by the responsible faculty member, student, or staff member.

No commercial activity, including taking photos or similar audio or visual recordings that are sold to others or otherwise used for commercial purposes, may occur on the campus without the University's permission. Requests for permission should be submitted to the Director of University Communications or, as appropriate, the Dean of Students, the Department of Athletics, or the Office of Public Events. Recognized student groups and official units of the University will be granted such permission so long as they do not violate privacy or property interests of others; so long as any sale of their products is predominantly on campus to students, faculty, and staff; and so long as they comply with applicable University policies and procedures.

Violators of this policy may be subject to criminal and/or civil liability, as well as University disciplinary action.
Many of the publications listed below, including this bulletin, may be viewed on the World Wide at www-leland.stanford.edu/dept/registrar/bulletin/.

Admissions information and applications can be obtained from the Office of Undergraduate Admissions, and Graduate Admissions in the Registrar's Office (Old Union).

Financial aid information for undergraduate and graduate students is available from the Financial Aid Office (Old Union).

Library guides, facts, maps, and borrowing regulations are available at service desks of all Stanford libraries (address request to Green Library).

Maps and visitors' guides can be obtained at the Visitors' Information Office in Memorial Court, at the Stanford Bookstore, or by writing to the Guide and Visitors Service at the Office of Public Affairs (Building 170).

Minority students, undergraduate and graduate, and their opportunities and experiences at Stanford are addressed in special publications directed to Alaska Natives, American Indians, Blacks, Chicanos, Mexican/Americans, and Puerto Ricans. The Office of Undergraduate Admissions and the recruitment officers of each of the respective schools will respond to requests for the appropriate publication.

Stanford University Bulletins may be obtained as follows: the Stanford Bulletin may be purchased from the Bookstore or by sending a $6.00 check or money order ($6.45 if a California resident; add $3.00 if domestic first class mail is desired) to the Registrar's Mailroom. Summer 'Session Catalogue or Summer Session for High School Student Catalogue may be obtained from the Summer Session Office. Individual schools and departments may be contacted directly for more specific information.

Students from other countries contact the Graduate Admissions the Registrar's Office for Information for International Applicants; Bechtel International Center also provides helpful information to the international community.

The Time Schedule (course listings and registration information) is published quarterly and may be obtained at the Information Window in the Office of the Registrar (Old Union) and in Portfolio.

Other publications of interest:
Access Stanford, a guide for the physically limited, available at the Office of the Dean of Student Affairs (Old Union) and the Disability Resource Center (Meyer Library).
ASSU: Constitution and By-Laws, inquire at Associated Students of Stanford University (Tresidder Union).
ASSU Course Guide, summaries of student evaluations of approximately 200 undergraduate courses, available at the ASSU Office (Tresidder Union).
Charter of the Senate of the Academic Council of Stanford University, available at the Academic Secretary's Office.
Committee and Senate Handbook, available at Academic Secretary's Office.
Conference Planning at Stanford, available at the Conference Office (Encina Commons).
Faculty Handbook, available at the Provost's Office.
Graduate Student Handbook, an introduction to offices and people who serve graduate students, available at the Office of the Dean of Graduate Research and Policy.
Human Resources and Development Course Catalogue, published twice-yearly by Stanford's Human Resources Services Office.
Information for Prospective Applicants, an introduction to graduate study and graduate programs at Stanford, available at Graduate Admissions, the Registrar's Office, Old Union.
Life Off the Farm, a guide to off-campus goods, services, and activities, available at the Office of Residential Education (Old Union) and the Stanford Bookstore.
The Lively Arts at Stanford season brochure of concerts and other performances, available at University Events (Press Bldg.).
Rosters of the Senate, Advisory Board, and Various Committees, available at the Academic Secretary's Office.
Stanford Daily, the student newspaper, available at many pickup sites on campus and by request to the Daily office (Storke Bldg.).
Stanford Directory, on sale at Stanford Bookstore and Stores.
Stanford from the Beginning, a history, available at the Visitors' Information Office in Memorial Court (write Guide and Visitors Service, Bldg. 170), and the Stanford Bookstore.
Stanford Map, on sale at the Stanford Bookstore.
Stanford Memorial Church, a guide and history, available at the Visitors' Information Office in Memorial Court (write Guide and Visitors Service, Bldg. 170) and the Stanford Bookstore.
The Stanford Observer, a newspaper for alumni, parents of students, and the University's other friends, available from News Service (Press Bldg.).
Stanford Report, the weekly faculty/staff newspaper (includes events calendar and employment opportunities), available from News Service (Press Bldg.).
Stanford Today, a detailed description of undergraduate opportunities, available from the Office of Undergraduate Admissions (Old Union).
Teaching at Stanford: An Introductory Handbook for Faculty, Academic Staff/Teaching, and Teaching Assistants, available at the Center for Teaching and Learning (Sweet Hall).
Training Opportunities for the Stanford Community, available at the Forsythe Hall information desk.

"Books about Stanford that are out of print or hard to find are available to scholars from the University Archives, Green Library. The Stanford University Archives manuscript and archival collections now number more than six million items. These are of related interest.
Clark, G. T., *Leland Stanford*, 1931
Elliott, O. L., *Stanford University: The First Twenty-five Years*, 1937
APPENDIX

COURSES CERTIFIED FOR 1997-98 AS FULFILLING THE UNDERGRADUATE GENERAL EDUCATION REQUIREMENTS

Information regarding the General Education Requirements may be found in the "Undergraduate Degrees" section of this bulletin.

The following courses have been certified as fulfilling the General Education Requirements in 1997-98. Certain sequences must be completed in their entirety for General Education Requirement fulfillment, and those sequences are noted below.

Courses offered overseas during 1997-98 which satisfy the General Education Requirements are listed at the end of this section.

GENERAL EDUCATION REQUIREMENTS, 1997-98

AREA 1

All freshmen entering in Autumn Quarter 1997 and thereafter must satisfy the Area 1 Requirement by completing three courses from among the following options:

AREA 1: INTRODUCTION TO THE HUMANITIES
Area One Program 1; Great Works I (offered autumn)
Area One Program 2, 3; Great Works II, III (2 must be taken in conjunction with 3; offered winter and spring)
Area One Program 11; Why Read It? (offered autumn)
Area One Program 12; Word and World (offered autumn)
Classics 1A, 1B; Ancient Mediterranean World (1A must be taken in conjunction with 1B; offered winter and spring)
German Studies 8A, 9A; Myth and Modernity (8A must be taken in conjunction with 9A; offered winter and spring)

AREA 1: CULTURES, IDEAS, AND VALUES
Anthropology 8, 9, 10; Origins, Encounters, and Identities (entire sequence must be completed)
Area One Program 4, 5, 6; Europe and the Americas (entire sequence must be completed)
Area One Program 1, 2, 3; Great Works I, II, III (entire sequence must be completed)
History 1, 2, 3; From Antiquity to the Present (entire sequence must be completed)
Humanities 61, 62, 63; Literature and the History of Ideas (entire sequence must be completed)
English 7, 8, 9; Literature and the Arts (entire sequence must be completed)
Philosophy 5A, 5B, 5C; Philosophy and Human Existence (entire sequence must be completed)
SLE 91, 92, 93; Program in Structured Liberal Education (entire sequence must be completed and thereby also satisfies Area 3a)

AREA 2: NATURAL SCIENCES, APPLIED SCIENCE AND TECHNOLOGY, AND MATHEMATICS
Science, Mathematics, and Engineering 1A, B, C; Earth Resources and the Sustainability of Life (entire sequence must be completed)
Science, Mathematics, and Engineering 2A, B, C; The Heart: Principles of Life Systems (entire sequence must be completed)
Science, Mathematics, and Engineering 3A, B, C; Light in the Physical and Biological Worlds (entire sequence must be completed)

AREA 2A: NATURAL SCIENCES
Anthropology 6; Human Origins
Anthropology 180A; Human Evolutionary Systems
Anthropology 180B; Beginning Human Osteology
Anthropology 180C; Advanced Human Osteology
Anthropology 181C; Human Evolutionary Anatomy
Anthropology 194; Origins of Modern Humans
Biology 10; The Study of Life: From Cells to Ecosystems
Biology 13N; Stanford Introductory Seminar: Environmental Problems and Solutions
Biology 14N; Stanford Introductory Seminar: Plants and Civilization
Biology 15N; Stanford Introductory Seminar: Environmental Literacy
Biology 16N; Stanford Introductory Seminar: Island Ecology
Biology 17N; Stanford Introductory Seminar: Biotechnology and Society
Biology 18N; Stanford Introductory Seminar: Plant Genetic Engineering
Chemistry 31; Chemical Principles
Chemistry 32; The Frontiers of Chemical Science
Chemistry 33; Structure and Reactivity
Earth Systems 10; Introduction to Earth Systems
Geological and Environmental Sciences 1; Fundamentals of Geology
Geological and Environmental Sciences 2; Earth History
Geological and Environmental Sciences 8; The Oceans: An Introduction to the Marine Environment
Geophysics 4; Natural Hazards and Human Survival
Human Biology 2A; Genetics, Evolution, and Ecology
Human Biology 3A; Cell and Developmental Biology
Human Biology 4A; The Human Organism
Human Biology 6; Human Origins
Human Biology 120; Human Nutrition
Human Biology 134; Ecological Anthropology
Physics 15A; The Nature of the Universe
Physics 15B; Cosmic Horizons
Physics 19; Introduction to Physics
Physics 21; Mechanics and Heat
Physics 23; Electricity and Optics
Physics 25; Modern Physics
Physics 27; Evolution of the Cosmos
Physics 28; Mechanics, Heat, Electricity, and Magnetism
Physics 29, Electricity and Magnetism
Physics 41; Mechanics
Physics 43; Electricity
Physics 45; Magnetism
Physics 47; Light and Heat
Physics 50; Astronomy Laboratory and Observational Astronomy
Physics 61; Advanced Freshman Physics
Physics 63; Advanced Freshman Physics
Physics 65; Advanced Freshman Physics
Physics 70; Modern Physics
Physics 100; Introduction to Observational and Laboratory Astronomy
Psychology 19Q; Stanford Introductory Seminar: Studies of Animal Behavior
Psychology 20; Brain and Behavior

AREA 2B: APPLIED SCIENCE AND TECHNOLOGY
Area 6 under the 1991 DR System
Aeronautics and Astronautics 100; Introduction to Aeronautics and Astronautics
Anthropology 185; Stone Tools in Prehistory
Civil and Environmental Engineering 170; Environmental Science and Technology
Computer Science 105; Introduction to Computers
Computer Science 106A; Programming Methodology
Computer Science 106B; Programming Abstraction
Computer Science 106X; Programming Methodology and Abstractions
Computer Science 109; Introduction to Computer Science
Engineering 1 (same as Science, Technology, and Society 51); The Nature of Engineering
Engineering 14; Applied Mechanics: Statics and Deformables
Engineering 15; Dynamics
Engineering 30; Engineering Thermodynamics
Engineering 40; Introductory Electronics
Engineering 50; Introductory Science of Materials

Engineering 62; Introduction to Operations Research
Engineering-Economic Systems and Operations Research 152; Introduction to Decision Analysis
Geological and Environmental Sciences 5; Earth's Nonrenewable Resources
Geological and Environmental Sciences 130; Environmental Earth Sciences I
Geophysics 40; The Earth from Space
Geophysics 170; Environmental and Geotechnical Geophysics
Petroleum Engineering 103; Energy Resources

AREA 2C: MATHEMATICS
Area 4 under the 1991 DR System
Economics 80; Introduction to Statistical Methods for Social Scientists
Economics 180; Mathematics for Economists
Math 19; Calculus
Math 20; Calculus
Math 21; Calculus
Math 41; Calculus
Math 42; Calculus
Math 51; Linear Equations and Differential Calculus
Math 51H; Honors Calculus
Math 103; Matrix Theory and its Applications
Philosophy 57; Logic, Reasoning, and Argumentation
Philosophy 159; Basic Concepts in Mathematical Logic
Psychology 10; Introduction to Statistical Methods
Sociology 181B; Sociological Methods I: Statistics
Statistics 40; Stanford Introductory Seminar: Chance
Statistics 41; Stanford Introductory Seminar: Math and Magic
Statistics 50; Stanford Introductory Seminar: Math in Sports
Statistics 60; Introduction to Statistical Methods
Statistics 110; Statistical Methods in Engineering and the Physical Sciences
Statistics 116; Theory of Probability
Statistics 190; Introduction to Statistical Methods

AREA 3: HUMANITIES AND SOCIAL SCIENCES

AREA 3A: HUMANITIES
Area 7 under the 1991 DR System is indicated by (7)
Area 8 under the 1991 DR system is indicated by (8)
American Studies 151; Transformation of American Thought and Culture (7)
American Studies 200; Perspectives on American Identity (7)
American Studies 214; The American 1960s: Thought, Protest, and Culture (7)
Art 1; Introduction to the Visual Arts (7)
Art 2; Ideas and Forms in Asian Art (7)
Art 3; Introduction to the History of Architecture (7)
Art 12; Theme and Style in Japanese Art (7)
Art 100A; Archaic and Early Classical Greek Art (7)
Art 100B; Ancient Art II: Classical and Hellenistic Greek Art (7)
Art 100C; Roman Art (7)
Art 105; Sites of Images and Power in 12th-Century Europe (7)
Art 110E; The Bauhaus (7)
Art 120E; Post-Naturalist Painting (7)
Art 121; Abstract Expressionism (7)
Art 123; Art and Technology (7)
Art 129A; Painting in Late Medieval and Early Modern Japan (7)
Art 130C; Around 1900: Visual Arts in America (7)
Art 130G; Victorian Art and Society (7)
Art 176; American Architecture and Urbanism (7)
Asian Languages 91; Traditional East Asian Civilization: China (7)
Asian Languages 92; Traditional East Asian Civilization: Japan (7)
Asian Languages 95; The Japanese Language in Culture and Society (7)
Asian Languages 131; Chinese Poetry in Translation (7)
Asian Languages 135; Japanese Drama in Translation (7)
Asian Languages 138; Modern Japanese Literature in Translation (7)
Asian Languages 141; Chinese Mythology and Lyrical Imagination (7)
Asian Languages 187/287; Romance, Desire, and Sexuality in Modern Japanese Literature (7)
Classics 12; Greek Tragedy (7)
Classics 15N; Stanford Introductory Seminar: Ecology of Literature and Philosophy (8)
Classics 18; Greek Mythology (7)
Classics 19N; Stanford Introductory Seminar: Gospel of John (7) or (8)
Classics 169; Introduction to the Ethics of Socrates, Plato, and Aristotle (7) or (8)
Drama 11N; Stanford Introductory Seminar: Shakespeare’s King Lear (7)
Drama 12N; Stanford Introductory Seminar: Antigone—From Ancient Democracy to Contemporary Dissent (7)
Drama 13N; Stanford Introductory Seminar: Technology and Popular Culture (7)
Drama 14N; Stanford Introductory Seminar: Contemporary German Drama from Brecht to Heiner Mueller (7)
Drama 15N; Stanford Introductory Seminar: Visual Aesthetics and the Theater (7)
Drama 161; Performance and Politics (7)
Drama 162; Performance and the Actor (7)
Drama 163; Performance and America (7)
English 5; Introduction to Literature (7)
English 10/110; Masterpieces of English Literature I (7)
English 11/111; Masterpieces of English Literature II (7)
English 12/112; Masterpieces of American Literature (7)
English 40/140; Introduction to Drama (7)
English 50/150; Poetry and Poetics (7)
English 60/160; English Bible (7) or (8)
English 65A/165A; Introduction to Medieval Culture (7) or (8)
English 65B/165B; Arthurian Literature (7)
English 68A/168A; Introduction to American Indian Studies (7)
English 70N; Stanford Introductory Seminar: Modern Short Fiction: Close Reading of a Text (7)
English 71N; Stanford Introductory Seminar: Metamorphoses (7)
English 72N; Stanford Introductory Seminar: Native Studies (7)
English 73N; Stanford Introductory Seminar: Writers at Work (7)
English 74N; Stanford Introductory Seminar: Chicano Culture (7)
English 80Q; Stanford Introductory Seminar: Kipling—Propagandist and Critic of Empire (7)
English 81Q; Stanford Introductory Seminar: Multimedia Metamorphoses (7)
English 83Q; Stanford Introductory Seminar: Satire (7)
English 84Q; Stanford Introductory Seminar: Native American Studies (7)
English 85Q; Stanford Introductory Seminar: The Plays of Shakespeare (7)
English 102; The History of the English Language (7)
English 113; The Renaissance (7)
English 119B; American and British Romanticism (7)
English 131; Eighteenth-Century British Novel (7)
English 132; Nineteenth-Century English Novel (7)
English 137; Development of the Short Story (7)
English 141; Renaissance Drama (7)
English 154A/B; British Romanticism and Literary Modernity (7)
English 157; Twentieth-Century Poetry and Philosophy (7)
English 161A; Afro-American Writing (7)
English 161H; Narration, Detection, and Social Marginality (7)
English 162G; Writing by Twentieth-Century Women of Color (7)
English 163C; Chicana Writers (7)
English 163G; Literary and Visual Culture in Eighteenth-Century Britain (7)
English 164B; Imagining the Holocaust (7)
English 166D; Introduction to Critical Theory
English 171; Chaucer
English 172; Milton
English 173B,C,F; Shakespeare
French 130; Middle Ages and Renaissance
French 131; Seventeenth- and Eighteenth-Century France
French 132; Nineteenth- and Twentieth-Century France
French 133E; Literature and Society in Africa and the Caribbean
French 278E; Topics in French and Francophone Literature
French and Italian 166E; Women’s Voices in Contemporary Italian Literature
French and Italian 208E; Female Saints
French and Italian 224E; Psychoanalytic Theory of Femininity
French and Italian 252E; Languages, Structures, and Societies: An Introduction to Structuralism
French and Italian 254E; Introduction to French Philosophy
French and Italian 284E; Women Writing in French
German 1N; Stanford Introductory Seminar: German Studies
German 38A/138; Introduction to the Germanic Languages
German 120N; Stanford Introductory Seminar: Nationality and the Discourse of Reason
German 121; Contemporary German Popular Culture
German 122B; The American West in the German Imagination
German 123N; Stanford Introductory Seminar: The Brothers Grimm and their Fairy Tales
German 124; Reading German Poetry in the Original
German 131; Eighteenth-Century Literature and Culture
German 132; Nineteenth-Century Literature and Culture
German 134P; Medieval Women
German 161B/231; Medieval Courtly Romance
German 162A; The Faust Legend in Literature and Film
German 168A/268; Hesse, Kafka, Mann
German 171A/271; Feminist Media Theories
History 125; Religion, Revolution, and Reaction in the German Reformation
History 13; The Emergence of Modern Medicine
History 14Q; Stanford Introductory Seminar: Science, Technology, and Art: The World of L. da Vinci
History 16N; Stanford Introductory Seminar: Crimes of Galileo
History 22N; Stanford Introductory Seminar: Ethnic Cleansing in Twentieth-Century Europe
History 27N; Stanford Introductory Seminar: First World War as Experience and Memory
History 50S; Race and Popular Culture (In Black and White)
History 51N; Stanford Introductory Seminar: A. Lincoln—Myth and Reality
History 53N; Stanford Introductory Seminar: Reflections on the American Condition
History 96S; Searching for Self: Biographies and Autobiographies in China
History 105A; Introduction to Medieval Culture
History 110; Storming Heaven: Christianity in Conflict in Early Modern Europe
History 120C; History of the Soviet Union
History 125; Twentieth-Century Eastern Europe
History 136A; European Thought and Culture in Nineteenth-Century or (8)
History 144; Britain 1688-1832
History 147A; African History through Novels and Film
History 147B; Idea of Africa among African Americans
History 150; African-American History
History 159; Introduction to Asian-American History
History 162 (same as English 124C); Introduction to Chicano/a History and Culture
History 187B; Middle East in the Twentieth Century
History 192A; Chinese History to the Thirteenth Century
History 192B; Chinese History from the Mongols to the Nineteenth Century
History 194A; Early and Medieval Japan
History and Philosophy of Science 60; Introduction to the History and Philosophy of Science
Italian 127; Italian History
Italian 128; The Middle Ages and the Renaissance
Italian 129; Mannerism to the Modern
Linguistics 1; Introduction to Linguistics
Linguistics 51N; Stanford Introductory Seminar: Diverse Language, Diverse Speakers
Linguistics 70; The Structure of English Words
Linguistics 72; Linguistic Approaches to Point of View in Fiction
Linguistics 120; Introduction to Syntax
Linguistics 130; Introduction to Semantics and Pragmatics
Literature, Cultures, and Languages 125A; The Contemporary Arab World and Culture through Literature
Literature, Cultures, and Languages 125C; Contemporary Arab Women Writers and Issues
(Literature, Cultures, and Languages 125D; Arab World through Travel Literature
Music 1; Introduction to Music
Music 2A; The Symphony
Music 5A; American Music
Music 14N; Stanford Introductory Seminar: Women Making Music
Music 14Q; Stanford Introductory Seminar: Topics in Interactive Computer Music Performance
Music 15N; Stanford Introductory Seminar: Role of Technology in the Arts
Music 15Q; Stanford Introductory Seminar: Opera on Film
Music 16N; Stanford Introductory Seminar: R. Wagner and the Ring of the Nibelung
Music 16Q; Stanford Introductory Seminar: Ki ho’alu—The New Renaissance of Hawaiian Musical Tradition
Music 19; Introduction to Music Theory
Music 21; Elements of Music I
Music 22; Elements of Music II
Music 111; N. American Taiko Seminar
Music 120; Introduction to Music Composition and Programming using MIDI-Based Systems
Music 149; History of Electroacoustic Music
Music 151; Psychophysics and Cognitive Psychology for Musicians
Philosophy 10; God, Self, and World
Philosophy 12N; Stanford Introductory Seminar: Happiness, Death, and the Meaning of Life
Philosophy 14N; Stanford Introductory Seminar: Ethical Status of Non-Human Animals
Philosophy 16N; Stanford Introductory Seminar: Shared Lives
Philosophy 20; Introduction to Moral Theory
Philosophy 30 (same as Political Science 51D, Public Policy 103A); Introduction to Political Philosophy
Philosophy 60; Introduction to History and Philosophy of Science
Philosophy 80; Mind, Matter, and Meaning
Philosophy 100; Greek Philosophy
Philosophy 102; Modern Philosophy
Religious Studies 4N; Stanford Introductory Seminar: Evolution of Early Christian Doctrine
Religious Studies 6N; Stanford Introductory Seminar: Readings in Asian Religions
Religious Studies 8; Religion in America
Religious Studies 10; Introduction to Religion
Religious Studies 11; Religious Classics of Asia
Religious Studies 14N; Stanford Introductory Seminar: Ethical Status of Animals
Religious Studies 15; The Hebrew Bible: Issues of Power
Religious Studies 18; Zen Buddhism
Religious Studies 23; Introduction to Buddhism
Religious Studies 24; Introduction to Christianity
Religious Studies 26; Early Christianity
Religious Studies 27; Introduction to Islam
Religious Studies 42; Philosophy of Religion
Religious Studies 43Q; Stanford Introductory Seminar: Finding your Voice
Religious Studies 44Q; Stanford Introductory Seminar: Philosophical Views of Nature
Religious Studies 53; Jews and Judaism in America
Religious Studies 55; Introduction to Chinese Thought
Religious Studies 109; God and Gender
Religious Studies 110; Islam in the Modern World
Religious Studies 116; Japanese Buddhism
Religious Studies 121; Peoples of the Book
Religious Studies 134; The Bible in Fiction
Religious Studies 172; Sex, Body, and Gender in Medieval Religion
Slavic Languages and Literature 11N; Stanford Introductory Seminar: Paris, London, Petersburg—City in the Nineteenth-Century
Slavic Languages and Literature 45/145; Age of Experiment
Slavic Languages and Literature 46/146; Violence and the Sacred in the Russian Novel
Slavic Languages and Literature 47/147; Russian Literature and Culture in the Twentieth-Century
Slavic Languages and Literature 129; Poetry as System: Introduction to Theory and Practice of Russian Verse
Slavic Languages and Literature 151; Dostoevsky
Slavic Languages and Literature 161; Poetess: Grammar of the Self
Slavic Languages and Literature 187; Russian Poetry of the Eighteenth- and Nineteenth-Centuries
Slavic Languages and Literature 188; From A. Blok to J. Brodsky: Russian Poetry of the Twentieth Century
Slavic Languages and Literature 193; Orthodox World
Spanish and Portuguese 110N; Stanford Introductory Seminar: Arts and Archives—Research in Chicano/a Cultural Studies
SLE 91, 92, 93; Program in Structured Liberal Education (entire sequence must be completed and thereby also satisfies Area 1)
AREA 3B: SOCIAL SCIENCES

Area 8 under the 1991 DR System is indicated by (8)
Area 9 under the 1991 DR System is indicated by (9)

American Studies 164; Introduction to Race and Ethnicity in the American Experience (9)
American Studies 179 (same as Political Science 182F); Introduction to American Law (9)
Anthropology 3; Human Prehistory (9)
Anthropology 4; Language and Culture (9)
Anthropology 110; Latino Culture (9)
Anthropology 121; Japanese Society and Culture (9)
Anthropology 151B; Theories of Race and Ethnicity (9)
Anthropology 162A; Social and Cultural Studies of Biotechnology (9)
Anthropology 168 (same as Human Biology 168); Medical Anthropology (9)
Asian Languages 71N; Stanford Introductory Seminar: Language and Gender in Japan (9)
Civil and Environmental Engineering 174; Ethical Issues in Civil Engineering (8)
Classics 17N; Stanford Introductory Seminar: Evolution of Early Christian Doctrine (8)
Classics 104; Early Christianity (8)
Classics 117; Gender, Violence, and the Body in Ancient Religion (9)
Classics 139; Medicine in Ancient Greece and Rome (9)
Classics/History 101; History of Greece (9)
Classics/History 102; Roman History I (9)
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Anthropology 118A; Twentieth-Century Chinese

Anthropology 121; Japanese Society and Culture

Anthropology 189; The Incas and their Ancestors

Art 2; Ideas and Forms in Asian Art

Asian Languages 91; Traditional East Asian Civilization: China

Asian Languages 92; Traditional East Asian Civilization: Japan

Asian Languages 131; Chinese Poetry in Translation

Asian Languages 132; Chinese Fiction in Translation

Classics 105; History and Culture of Egypt

Economics 121; Economies of Greater China and the World

Economics 124; Japanese Economy

French 133E; Literature and Society in Africa and the Caribbean

History 85Q; Stanford Introductory Seminar: Jews and Muslims

History 90Q; Buddhist Political and Social Theory

History 96S; Searching for Self-Biographies and Autobiographies in China

History 147A; African History in Novels and Film

History 148C; Africa in the Twentieth Century

History 186A; Modern India

History 187B; Middle East in the Twentieth Century

History 189A; Israel: 1880 to the Present

History 192A; Chinese History to the Thirteenth Century

History 192B; Chinese History from the Mongols to the Nineteenth Century

History 192C; Modern and Contemporary Chinese History

History 194D; The Rise of Modern Japan

History 296; Ordinary Lives: Social History of Early Modern China

Latin American Studies 80 (same as History 80); Culture, Society, and Politics in Latin America
Literature, Cultures, and Languages 125A; The Contemporary Arab World and Culture through Literature
Political Science 115; Chinese Politics
Political Science 118A; Political Change in Tropical Africa
Psychology 140; Culture and Human Development
Religious Studies 18; Zen Buddhism

AREA 4B: AMERICAN CULTURES
Area 3 under the 1991 DR System
African and Afro-American Studies 105; Introduction to African and Afro-American Studies
American Studies 164; Introduction to Race and Ethnicity in the American Experience
American Studies 214; The American 1960s: Thought, Protest, and Culture
Anthropology 102; Native American Cultures of North America
Anthropology 110A; Latino Cultures
Comparative Literature 168; Introduction to Asian American Culture
Comparative Literature 202; Comparative Ethnic Biography
Comparative Literature 204Q; Stanford Introductory Seminar: Ethnicity in Literature
Drama 163; Performance and America
History 505; Race and Popular Culture
History 61; The Constitution and Race
History 147B; The Idea of Africa among African Americans
History 150; African American History
History 157; Introduction to African-American History
History 159; Introduction to Asian-American History
History 162 (same as English 124C); Introduction to Chicano/a History and Culture
History 164; Introduction to Race and Ethnicity in the American Experience
History 165B; Nineteenth-Century America
Music 16Q; Stanford Introductory Seminar: Kihō'alu—The New Renaissance of Hawaiian Musical Tradition
Music 111; North American Taiko Seminar
Political Science 160; The American Dream
Sociology 138/238; American Indians in Comparative-Historical Perspective
Sociology 139/239; American Indians in Contemporary Society

AREA 4C: GENDER STUDIES
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Classics 117; Gender, Violence, and the Body in Ancient Religion

OVERSEAS STUDIES
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AREA 2B: APPLIED SCIENCE AND TECHNOLOGY
Area 6 under the 1991 DR System
Introductory Electronics
Introductory Science of Materials

AREA 3: HUMANITIES AND SOCIAL SCIENCES
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Area 8 under the 1991 DR System is indicated by (8)
Architecture and the City 1871-1990 (7)
Contemporary Theater (7)
German Film in its European Context (7)
Industry, Technology, and Culture 1780-1945 (7)
Musik, Kultur, Gesellschaft (7)
The Industrial Revolution and its Impact on Art, Architecture, and Theory (7)
Women, Literature, and Political Change (8)

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Nationalism and Political Culture in Germany (9)
The History of German and European Economic Philosophy (8)
Political Economy of Contemporary Germany (9)
Transition in Germany and Eastern Europe (9)
European Environmental Policy (9)
European Integration (9)
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AREA 4: WORLD CULTURES, AMERICAN CULTURES, AND GENDER STUDIES
AREA 4C: GENDER STUDIES
Women, Literature, and Political Change

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AREA 3: HUMANITIES AND SOCIAL SCIENCES
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<$FL10nocap>Area 8 under the 1991 DR system is indicated by (8)
The Duomo and Palazzo della Signoria: Symbols of a Civilization (7)
From Giotto to Michelangelo: Introduction to the Renaissance in Florence (7)
Realism, Utopia, Myth, and Society in Italian Cinema (7)
Rebellion and Renewal: The Italian Renaissance (8)
Representations of Italy through the Eye of the Camera (7)
The Scientific Revolution: From the Renaissance to the Eighteenth Century (8)

AREA 3B: SOCIAL SCIENCES
Area 9 under the 1991 DR System
Italy: From an Agrarian to a Post-Industrial Society
The Integration of Europe
Italian Politics since 1989 in its International Context
The Political Economy of Industrial Change: Italy and Europe in a Global System

KYOTO
AREA 2: NATURAL SCIENCES, APPLIED SCIENCE AND TECHNOLOGY, AND MATHEMATICS
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Introductory Electronics
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AREA 3: HUMANITIES AND SOCIAL SCIENCES
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AREA 4: WORLD CULTURES, AMERICAN CULTURES, AND GENDER STUDIES
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MOSCOW
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AREA 3B: SOCIAL SCIENCES
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Gender and Cultural Change in Early Modern Russia

OXFORD
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African History through the African Novel
Art and Society in Britain
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Britain and Africa in Post-Colonial Era
Britain in an Era of Two World Wars
Constitutional Law in Britain
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Race and Ethnicity in Modern Britain
Social Change in Modern Britain
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African History through the African Novel
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