STANFORD UNIVERSITY

Courses, Degrees, and Information 1994-95
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.

While 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.

Stanford, California
ACADEMIC CALENDAR 1994-95

AUTUMN QUARTER, 1994

Sep 26-27 (Mon-Tue)  Last day to arrange payment of University fees
28 (Wed) Instruction begins
Sep 29 (Thu)  Conferral of degrees — Summer Quarter
Nov 24-27 (Thu-Sun) Thanksgiving recess (no classes)
Nov 27 (Sun) Last day for filing A.B., B.S., and B.A.S. application for January (Autumn Quarter) conferral
Dec 9 (Fri) Last day for filing candidacy applications for Educational Specialist or Engineer degree for April (Winter Quarter) conferral
9 (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
12-16 (Mon-Fri) End-Quarter examinations

WINTER QUARTER, 1995

Jan 9 (Mon) Last day to arrange payment of University fees
10 (Tue) Instruction begins
12 (Thu) Conferral of degrees — Autumn Quarter
16 (Mon) Observance of Martin Luther King Day (holiday, no classes)
Feb 20 (Mon) Observance of Presidents’ Day (holiday, no classes)
26 (Sun) Last day for filing A.B., B.S., and B.A.S. application for April (Winter Quarter) and June (Spring Quarter) conferral
26 (Sun) Last day for filing graduate Graduation Application for June commencement diploma
Mar 12 (Sun) Observance of Founders’ Day
17 (Fri) Last day for filing candidacy applications for Educational Specialist or Engineer degree for June (Spring Quarter) conferral
17 (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
20-24 (Mon-Fri) End-Quarter examinations

SPRING QUARTER, 1995

Apr 3 (Mon) Last day to arrange payment of University fees
4 (Tue) Instruction begins
6 (Thu) Conferral of degrees — Winter Quarter
May 1 (Mon) Filing deadline for undergraduate financial aid applications for matriculated undergraduates
May 29 (Mon) Memorial Day (holiday, no classes)
June 7 (Wed) Last day for filing candidacy applications for Educational Specialist or Engineer degree for September (Summer Quarter) conferral
7 (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
8 (Thu) No Classes
9-14 (Fri-Wed) End-Quarter examinations
17 (Sat) Baccalaureate Saturday and Senior Class Day
18 (Sun) Commencement

SUMMER QUARTER, 1995

26 (Mon) Last day to arrange payment of University fees
27 (Tue) Instruction begins
July 4 (Tue) Independence Day (holiday observance, no classes)
Aug 18-19 (Fri-Sat) Eight-week term examinations
19 (Sat) Eight-week term closes
28 (Mon) Last day for filing candidacy applications for Educational Specialist or Engineer degree for January (Autumn Quarter) conferral
28 (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
Sep 5 (Tue) Quarter closes
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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. 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 research 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 sex-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 1992-93 the completion or graduation rate for students who entered Stanford University full-time in 1987 was 92 percent. Enrollment in Autumn Quarter 1993 totaled 14,002, of whom 6,573 were undergraduates and 7,429 were graduate students. Blacks, Hispanics, Puerto Ricans, and Native Americans numbered 1,332 undergraduates and 700 at the graduate level. Stanford awarded 4,232 degrees in 1992-93, of which 1,730 were baccalaureate and 2,707 were advanced degrees.

Among the 1,398 faculty are 12 Nobel laureates, 97 members of the National Academy of Sciences, 162 members of the American Academy of Arts and Sciences, 61 members of the National Academy of Engineering, 16 members of the National Academy of Education, 19 winners of the National Medal of Science, 28 members of the American Philosophical Society, 6 Pulitzer Prize winners, and 14 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. The remaining land is essentially open space on which the University pays annual taxes.

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 GOVERNANCE
AND ORGANIZATION

DIRECTORY

THE BOARD OF TRUSTEES

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ADMINISTRATIVE
ORGANIZATION

EXECUTIVE OFFICERS, 1994-95

President: Gerhard Casper
Provost: Condoleeza Rice
Chief Financial Officer: Peter W. Van Etten
Vice President and Dean, School of Medicine: David Korn
Vice President for Development: John B. Ford
Vice President for Faculty and Staff Services: Barbara S. Butterfield
Vice Provost and Dean of Student Affairs: Mary M. Edmonds
Interim President and Chief Executive Officer, Stanford University Hospital and Stanford Health Services: Peter W. Van Etten
President and Chief Executive Officer, Lucile Packard Children's Hospital at Stanford: Lorraine Zippieri
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 by-laws and a series of resolutions on major policy. Membership — Board membership is set at a minimum of 25 and a maximum of 35, including the President of the University who serves ex officio. 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 reelection until after a lapse of one year. Eight of the Trustees are elected by alumni ballot. Four 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 president, one or more vice presidents, 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; Development; External Affairs and Alumni Affairs; Finance; and Land and Build-
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 Libraries of the University (C-LU)
Committee on Parking and Transportation (C-PT)

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 and Dean of Student Affairs, the Vice Provost and Dean of Libraries and Information Resources, the Vice Provost for Faculty Recruitment and Development, and the Vice Provost for Institutional Planning and Financial Affairs.

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 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 Council and are appointed by the Committee on 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, the 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 By-Laws, which was last revised and approved by student vote in May 1969 and ratified by the Board of Trustees in September 1969.
Executive — The four members of the Council of Presidents are 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 made up of forty elected representatives, twenty each from the undergraduate and graduate communities. Only ten undergraduate and ten graduate senators may vote at any one time. 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 the ultimate authority 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—See "The Legislative and Judicial Charter" section of this bulletin.
ADMISSIONS AND FINANCIAL AID

ADMISSIONS

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 1,600 students. Between 100 and 150 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 admissions 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 diverse group of undergraduates. 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. Admissions 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 of African Americans, Mexican Americans, and Native American Indians in the undergraduate community. 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 Undergraduate Admissions and Financial Aids.

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.” Admissions officers select undergraduates they believe will benefit most from the University’s resources, contribute to its community, 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 Admissions, 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 have not been admitted to any Stanford degree program and are admitted 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 Academic Standing Office. The two most common categories of nonmatriculated undergraduate status are described below.

High School Nonmatriculated Students — Local high school students are eligible 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.

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

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 Stanford undergraduates to study for a bachelor’s and master’s degree simultaneously in the same or different departments. Applications must be submitted at least four quarters in advance of the expected master’s degree conferral date. Stanford undergraduate students may apply as early as the eighth quarter (or upon completion of 105 units) but no later than the eleventh quarter of undergraduate study. Students who decide to apply for admission to master’s programs after these deadlines are not eligible for the coterminal program. They must apply through the regular graduate admission process.

APPLICATION FOR A NON-COTERMINAL MASTER’S

Application forms 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.

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.

UNIVERSITY DIVISION

Under exceptional circumstances, students are accepted for graduate study without having obtained the bachelor’s (or equivalent foreign) degree. Applicants are considered for admission through the University Division 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. Such students may be required
ADMISSIONS AND FINANCIAL AID

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 is 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 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 a master's degree and two quarters toward an 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. The closing date for applications for nonmatriculated status is one month before the start of the quarter. Applicants interested in nonmatriculated student status for only the Summer Quarter apply through Summer Session, Office of the Registrar, Stanford University, Stanford, CA 94305-3005.

OPPORTUNITIES FOR STUDY AT OTHER UNIVERSITIES

The Exchange Scholar Program is open to doctoral students in the fields of humanities, social sciences, and sciences. It enables a graduate student who has completed one full year of study in one of the participating institutions to study at one of the other graduate schools for a maximum of one academic year 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, and Yale University. Further information on the program may be obtained from the Graduate Degree Support Section, Old Union, or from the graduate dean's office at participating institutions. Some institutions may place restrictions on specific departments.

Stanford also has separate exchange programs with the University of California, Berkeley and the University of California, San Francisco. These programs are open to matriculated graduate students at Stanford in all departments and enable them to take courses not offered on the home campus. Units earned at U.C. Berkeley and/or U.C. San Francisco will be applied to the Stanford student record. Further information may be obtained from the Registrar's Office.

POSTDOCTORAL SCHOLARS

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. Prospective Postdoctoral Scholars should write directly to the department in which they wish to study.

VISITING SCHOLARS

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.

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 for graduate students may be obtained from Graduate Admissions, Registrar’s 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. The University does not award its scholarships on the basis of merit or to help cover the parents’ contribution.

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 20% 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 may reduce the self-help 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 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 ($2,995 for 1994-95), 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 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
APPLICATION AND AWARD
NOTIFICATION PROCESS
FILING DEADLINES
Prospective freshmen after January 1 and before February 1, 1994
Prospective transfers after January 1 and before March 15, 1994
Returning students after January 1 and before April 25, 1994

APPLICANT DOCUMENTS
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.

1. Free Application For Student Aid (FAFSA), which must be processed by a Multiple Data Entry (MDE) processor. California residents must also submit a GPA Verification Form or SAT scores to the California Student Aid Commission (CSAC) by April 2, 1994, for Cal Grant consideration.


3. Financial Aid Form (FAF) processed by the College Scholarship Service (CSS).

4. 1993 Tax Statements including Schedules and W-2s or Non-filer's Statements.

5. Financial Aid Transcripts (FAT).

6. CSS's Divorced/Separated Parent's Statement (when applicable).

7. CSS's Business/Farm Supplement (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 a Multiple Data Entry (MDE) processor

2. Stanford Supplemental Application

3. Financial Aid Transcripts (FAT)

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

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, and 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 Financial Aids Office (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 if their applications are complete. The FAO begins mailing award notices to continuing and returning applicants approximately the middle of July. Applicants who file after April 25 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.

ROTC SCHOLARSHIPS AND GRANTS
Funds are received from the Army, Navy, or Air Force in exchange for future service commitments. Stanford University does not accept for transfer credit any work done as part of the ROTC programs, except the University of California, Berkeley's Department of Naval Architecture course XB10, Ship Systems, which is required of all Navy ROTC students. Students interested in ROTC should contact: Department of the Air Force, San Jose State University, San Jose, CA 95192-0051; phone 408-924-2961.
GRADUATE

Academic departments at Stanford University offer financial support to many graduate students. Funds are most often targeted to doctoral candidates and will rarely cover all costs of single students. Students will 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 departmental advisors 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 Guide to Graduate Admissions. 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. California residents in particular are urged to apply for State Graduate Fellowships. 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 (formerly the Guaranteed 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 214, Stanford, CA 94305-3021; phone 415-723-3058. 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:
18 ADMISSIONS AND FINANCIAL AID

1. A fully completed Free Application For Federal Student Aid (FAFSA)
2. Stanford Graduate Student Loan Supplement
3. Financial Aid Transcripts from all previously attended colleges and universities, whether or not aid was received at those institutions
4. Signed copy of 1993 IRS tax statement including schedules

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. Experienced advisers are 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 extend repayment up to 30 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 9 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% 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 130 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, room 141, Old Union. 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.
TUITION, FEES, AND HOUSING

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:

<table>
<thead>
<tr>
<th>Department/Program</th>
<th>1994-95</th>
</tr>
</thead>
<tbody>
<tr>
<td>All departments and schools</td>
<td>6,223</td>
</tr>
<tr>
<td>Graduate Division in Engineering</td>
<td>6,658</td>
</tr>
<tr>
<td>Graduate School of Business</td>
<td>7,063</td>
</tr>
<tr>
<td>School of Medicine (M.D. Program)</td>
<td>7,708</td>
</tr>
<tr>
<td>School of Law (payable Autumn and Spring Semesters)</td>
<td>10,602</td>
</tr>
</tbody>
</table>

Regular tuition fees apply to the undergraduate Overseas Studies Program. For Summer Quarter tuition, see the Stanford University bulletin, Summer at Stanford.

UNDERGRADUATES

During Autumn, Winter, and Spring Quarters, undergraduates are expected to register at full tuition. Undergraduates who have completed at least twelve full-time quarters and are in the terminal quarter may petition to register for 8, 9, or 10 units and pay the corresponding tuition rates. No tuition reduction from regular to part time or for dropped courses or units will be made after the first two weeks of the quarter. Students required to have fifteen full-time quarters for dual A.B. and B.S. degrees or for cotermination bachelor's and master's degrees must be registered during Summer Quarters at full tuition for these quarters to count as full-time quarters.

Undergraduates who are twenty-five years old or older may request to register for partial tuition at the 8-, 9-, or 10-unit rate.

Enrollment at Stanford during Autumn, Winter, and Spring Quarter is considered to be full-time with the payment of 11 or more units of tuition. Enrollment at Stanford during Summer Quarter is considered to be full-time with the payment of 15 or more units of tuition. Transfer work is considered if the work has been approved by the Transfer Credit Evaluator in the Registrar's Office and appears as transfer work on the Stanford transcript. Fifteen quarter units of transfer work are credited as one full-time quarter of tuition. Advanced placement units do not count in this calculation.

During Summer Quarter, different tuition requirements apply. Graduate students in most departments and all Stanford undergraduates may pay unit-basis tuition for 3 or more units.

Tuition exceptions may be made for illness or handicap, pregnancy (in the last trimester), new-parent relief (for both fathers and mothers), or other instances at the discretion of the Registrar.

Permit To Attend (auditing), when granted, is $1,540 a quarter.

GRADUATE STUDENTS

In most departments, graduate students may register for 8, 9, or 10 units of credit with the approval of the major department and upon payment of the appropriate unit-basis tuition. This arrangement will count only as a partial quarter of residence toward meeting the requirements for advanced degrees. Graduate students in schools and departments affiliated with the Honors Cooperative Program (including the School of Engineering and the Departments of Statistics, Mathematics, and Applied Physics) are assessed full tuition unless they are in one of the specifically approved categories exempted from this requirement.

Graduate students may register on the unit basis (3-9 units) if they are Stanford staff members, are currently employed as full-time teachers, are completing the final requirements for a degree, or have Stanford fellowships or assistantships that require part-time registration. Advanced Graduate Registration (AGR) is a 9-unit registration category available to doctoral students who have accrued nine full-tuition quarters of residency. Terminal Graduate Registration (TGR) is a reduced tuition category that requires payment of $760 per quarter in the 1994-95 Academic Year. TGR is available to graduate students who have completed course work and residency requirements for an advanced degree and are working on a department project, thesis, or dissertation. Eligibility criteria for AGR and TGR are provided in the "Administrative Procedures for Graduate Students" section of this bulletin.

Nonmatriculated graduate students pay the same tuition rate as matriculated students.

Postdoctoral scholars pay TGR fees.

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**

Contact the Undergraduate Admissions Office for information about the undergraduate application fee and the Graduate Admissions, 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**

The Associated Students of Stanford University (ASSU) fees are established by student vote in Spring Quarter. The 1994-95 ASSU fees are:

- Autumn, $34
- Winter, $32
- Spring, $35
- Summer, $9

Quarterly fees are assessed at registration. All the fees are refundable except some small surcharges. Refunds can be requested during the first three weeks of each quarter per instructions advertised in the Stanford Daily. Those eligible will be mailed refund checks in the seventh week of the quarter.

**DOCUMENT FEE**

In September 1993, Stanford University instituted a one-time Document Fee, required of all students who enter new degree programs or are admitted to non-degree programs effective Autumn Quarter 1993 or after. The fee is paid once only, regardless of the number of degrees a student may ultimately pursue and covers a variety of administrative costs that the University incurs as part of its normal student service functions. By instituting the one-time Document Fee, the University has been able to avoid imposing a number of fees that other institutions charge for services provided to students—such as enrollment verification, degree certification, course drops and adds, and diploma production. In addition, the Document Fee enables the University to eliminate charges for individual official transcripts and charges for establishing and administering credentials files in the Career Planning and Placement Center.

**SPECIAL FEES**

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

**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.

**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.

**Vehicle Registration**—Students must register their motor vehicles with the Department of Public Safety.

**HOUSING**

Bulletins with further information on housing rates are Summer at Stanford, 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 1994-95 academic year are as follows:

<table>
<thead>
<tr>
<th>Residences</th>
<th>Room Rates*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate Dormitories (includes all dormitories, American Studies, and Yost)</td>
<td>$1,150 1,053 1,026 3,229</td>
</tr>
<tr>
<td>Graduate Dormitories (Crothers and Crothers Memorial)</td>
<td>1,046 958 932 2,936</td>
</tr>
<tr>
<td>Self-op/Co-op Houses (student-managed residences)</td>
<td>1,231 1,127 1,098 3,456</td>
</tr>
<tr>
<td>Theme/Semi-self-op Houses</td>
<td>Bob, Durand, EAST, 553 Mayfield, Grove, Haus Mitteleuropa, La Maison Francaise, La Casa Italiana Muwekma-tah-ruk, Roth, Slavianskii Dom, Storey, and Xanadu</td>
</tr>
</tbody>
</table>
PAYMENTS 21

Manzanita Mobile
Homes 825 755 736 2,316
Mirrielees (apartments) 1,299 1,190 1,159 3,648
Suites 1,286 1,177 1,146 3,609
Liliore Green Rains
Houses (single graduate student apartments) 1,245 1,140 1,110 3,495
Escondido Village (single graduate student apartments)
1 bedroom (single occupancy) 2,190 2,004 1,952 6,146
1 bedroom (double occupancy) 1,095 1,002 976 3,073
2 bedroom 1,245 1,140 1,110 3,495
3 bedroom 1,167 1,068 1,040 3,275
Escondido Village (apartments for couples without children)
1 bedroom 2,190 2,004 1,952 6,146
2-bedroom loft 2,490 2,280 2,220 6,990
Escondido Village (apartments for students with children)
1 bedroom $738 per month
2 bedroom $830 per month
3 bedroom $1,002 per month
4 bedroom $1,191 per month

* 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 the Stanford Housing Center 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 1994-95 academic year:

<table>
<thead>
<tr>
<th>Meal Plans</th>
<th>Aut.</th>
<th>Win.</th>
<th>Spr.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-You-Can-Eat Plans: for residents of Branner, Lagunita, Moore, Roble, Wilbur</td>
<td>$1,272</td>
<td>1,163</td>
<td>1,132</td>
<td>3,567</td>
</tr>
<tr>
<td>19 meals/week</td>
<td>1,195</td>
<td>1,092</td>
<td>1,063</td>
<td>3,350</td>
</tr>
<tr>
<td>14 meals/week</td>
<td>1,128</td>
<td>1,031</td>
<td>1,004</td>
<td>3,163</td>
</tr>
<tr>
<td>Plus Plan: for residents of Branner, Lagunita, Moore, Roble, Wilbur</td>
<td>1,272</td>
<td>1,163</td>
<td>1,132</td>
<td>3,567</td>
</tr>
<tr>
<td>12 meals/week plus points</td>
<td>1,195</td>
<td>1,092</td>
<td>1,063</td>
<td>3,350</td>
</tr>
<tr>
<td>♠ La Carte Plans: for residents of Manzanita Park, Sterling Quadrangle, Stern</td>
<td>$1,272</td>
<td>1,163</td>
<td>1,132</td>
<td>3,567</td>
</tr>
<tr>
<td>Premium a la Carte</td>
<td>1,195</td>
<td>1,092</td>
<td>1,063</td>
<td>3,350</td>
</tr>
<tr>
<td>Regular a la Carte</td>
<td>1,128</td>
<td>1,031</td>
<td>1,004</td>
<td>3,163</td>
</tr>
<tr>
<td>Lite a la Carte</td>
<td>1,167</td>
<td>1,068</td>
<td>1,040</td>
<td>3,275</td>
</tr>
<tr>
<td>Open Kitchen Plans: for residents of American Studies and Yost</td>
<td>1,245</td>
<td>1,140</td>
<td>1,110</td>
<td>3,495</td>
</tr>
</tbody>
</table>

*All rates are approximate and subject to change.
† Administrative fee will be withheld from the a la carte dollars given to spend. A la carte “points” and “plus points” do not carry over from quarter to quarter.

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, and so on. 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, Parent-Loan Program, 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.

**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. The tuition will be refunded in full. Such students will not be 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 will 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 will be 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 will 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 will receive a full refund of tuition fees.

A student in good standing who wishes to take a Leave of Absence after a term begins may make such a request up to the last four weeks of the term (and thereafter only for approved health and emergency reasons) by petition filed in the Registrar’s Office. When a leave of absence is granted, effective within two weeks after the first day of instruction, the refund will be the tuition paid less $1,355. Between two and four weeks after the first day of instruction, the refund will be the tuition paid less $2,525. Thereafter, no refund will be allowed. Such students will be shown in the University records as having registered for the term and as having taken a leave of absence. No course work will be 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 the "Leave of Absence" and "Official Leaves of Absence for Graduate Students" sections of this bulletin). School of Law students on the semester system may apply for a leave of absence with partial tuition refund within the fifth and sixth weeks of the School of Law's semester. Financial aid recipients should be aware that a proportion of any refund will be returned to the various sources of aid. A leave of absence will not cancel a student's health insurance coverage. The refund schedule for students in their first quarter of enrollment varies slightly from that described above. Please contact the Registrar's Office for details.

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, students will receive refunds on the same basis as those receiving leaves of absence.

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.

Refunds of meal plan fees can be requested when a student surrenders his or her meal card to University Dining Services. Students may not turn in meal cards for refunds if they are residents of University housing where a meal plan is required.

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 room and meal plan refunds should contact the Stanford Housing Center or (for meal plan refunds) the central office of University Dining Services.

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 Office of Residential Education in room 306, Old Union, 415-725-2800. Housing assignments are administered by the Stanford Housing Center in room 110, Old Union, 415-725-2810. University maintenance and dining services are provided by Housing and Dining Services at 765 Pampas Lane, 415-723-2287. In addition, many other University offices — including the Undergraduate Advising Center and the Cowell Student Health Center — work closely with and in support of the residence program.

UNDERGRADUATE STUDENT RESIDENCES

RESIDENTIAL EDUCATION PROGRAM

The program in Residential Education provides for all 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 are integral to a Stanford education. Residential Education programs extend the classroom into the residences and complement the academic curriculum with activities and experiences essential to students' preparation for a life of leadership, intellectual engagement, citizenship, and service.

ASSIGNMENT TO UNDERGRADUATE RESIDENCES

All freshmen are required to live in University residences for educational reasons and are automatically assigned to space in the housing system by the New Undergraduate Student Information Project in the Stanford Housing Center. Residence assignments for sophomores, juniors, and seniors are made on the basis of an annual lottery (called the Draw) and quarterly waiting lists. Undergraduates who enter Stanford as freshmen in autumn 1992 or later are guaranteed four years of University housing if they are willing to live anywhere on campus.
SINGLE GRADUATE STUDENT RESIDENCES

Stanford provides housing for a large number of single graduate men and women. Priority for housing in the two traditional graduate dormitories is given to law students in Crothers Hall and School of Engineering students in Crothers Memorial Hall. All single graduate men and women may also apply for accommodations in apartments in Escondido Village and the Liliore Green Rains Houses. Escondido Village includes one-bedroom apartments shared by two students, one-bedroom apartments for one student, two-bedroom apartments, and three-bedroom apartments. The Liliore Green Rains Houses consist of two- and four-bedroom apartments. The Manzanita Mobile Homes offer three-bedroom units for graduate students. In addition, there are some spaces for graduate students in the six undergraduate co-operative houses.

COUPLE AND STUDENT-WITH-CHILDREN RESIDENCES

One-, two-, three-, and four-bedroom apartments are provided in Escondido Village 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. New matriculated student couples who apply for housing by the May deadline 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. Applications received after the May deadline are placed on a waiting list for assignment during the summer. Further information may be obtained from the Stanford Housing Center, 110 Old Union, Stanford University, Stanford, CA 94305-3012 or by phoning 415-725-2810.

OFF-CAMPUS RENTAL HOUSING

The Off-Campus Rental Housing Office, 110 Old Union, 415-723-3906, 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. 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. Other information and publications such as Living Off Campus and Life Off the Farm may be obtained from the Off-Campus Rental Housing Office, 110 Old Union, Stanford University, Stanford, CA 94305-3012 or by phoning 415-723-3906.
The following description of academic degree requirements applies to all students of Stanford University. For department or school requirements, see the appropriate sections of this bulletin.

**UNDERGRADUATE DEGREES**

**BACHELOR OF ARTS (A.B.)**

**BACHELOR OF SCIENCE (B.S.)**

**BACHELOR OF ARTS AND SCIENCE (B.A.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 (see the deadlines in the quarterly Time Schedule calendar), and who have fulfilled the following requirements:

1. Minimum of 180 units of University work.
2. Writing, Distribution, and Language Requirements.
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, students who have earned at least 135 units in resident work and who have completed the Writing, Distribution, and Language Requirements, as well as all major requirements, may petition for a 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 have completed two sets of major curricular requirements with no overlapping courses (one set leading to a Bachelor of Arts degree and the other leading to a Bachelor of Science), who have applied in advance for graduation with the B.A.S. degree instead of the A.B. or B.S. degree, and who have been recommended by the C-AAA. Candidates for the B.A.S. must fulfill requirements 1, 2, 4, and 5 above in addition to the major requirements.

If a student fails to meet all graduation requirements after having applied to graduate, he or she must reapply to graduate in a subsequent quarter. Please note that degree candidates may graduate in Autumn, Winter, Spring, or Summer Quarter, but the University awards all diplomas in June. Stanford University awards no honorary degrees.

**B.A.S. AND DUAL BACHELOR’S DEGREE PROGRAMS**

A Stanford undergraduate may work concurrently toward an A.B. degree and a B.S. degree. 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 in the two departments from which the student expects to receive degrees.

In order to qualify for both degrees, a student must complete the University and department requirements for each degree and must complete the University residence requirement for dual degrees—fifteen full-tuition quarters or three full-tuition quarters after completing 180 units; a student must complete a minimum of 225 units for the dual-degree option. In no case may more than six full-tuition quarters at another institution be applied to the University residence requirement.

A student who completes the academic requirements of both an A.B. degree and a B.S. degree, but who does not complete the residence requirements for both, may elect to receive a Bachelor of Arts and Science (B.A.S) degree. Students electing the B.A.S. degree must fulfill the requirements of one A.B. and one B.S. major without overlapping courses; the B.A.S. requires the completion of 180 units. Alternatively, a student whose residence is not sufficient for two degrees...
may elect to receive either the A.B. or the B.S. degree and to have a notation on his or her transcript that the requirements for the other major were also completed. (See the explanation of secondary majors in “The Major” section to follow.)

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. However, the holder of a Bachelor of Arts degree from Stanford may apply to the Subcommittee on Academic Standing, Petitions, and Exceptions 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 degree programs.

BACCALAUREATE HONORS

Students are 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.

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 20 percent of the graduating class.

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

HONORS PROGRAMS

School of Education — In recognition of successful completion of honors work in the School of Education, the school recommends majors in any field for honors. Honors in Education complements study in a departmental major.

Environmental Science, Technology, and Policy — In recognition of successful completion of work in the interdisciplinary Honors Program in Environmental Science, Technology, and Policy, the program recommends students for honors certification. The certification program complements study in a departmental major.

Ethics in Society — In recognition of successful completion of interdisciplinary course requirements and a thesis supervised by faculty in the Ethics in Society Program, the program recommends majors in any field for honors. Honors in Ethics and Society is intended to complement study in a departmental major.

Feminist Studies — In recognition of successful completion of honors work in Feminist Studies and a major in any field, the Program in Feminist Studies recommends students for honors certification. The certification program supplements a regular departmental major.

Humanities — In recognition of successful completion of work in the Humanities Honors Program, the program recommends majors in any field for honors. Humanities honors may be taken in addition to a departmental major.

Jewish Studies — In recognition of successful completion of interdisciplinary course requirements and a thesis supervised by faculty in Jewish Studies, the program recommends majors in any field for honors. The Honors Program in Jewish Studies supplements a regular departmental major.

Latin American Studies — In recognition of successful completion of interdisciplinary work in Latin American Studies, the program recommends majors in any field for honors. Latin American Studies honors certification is intended to complement study in a departmental major.

Science, Technology, and Society — In recognition of successful completion of work in the interdisciplinary Honors Program in Science, Technology, and Society, the program recommends majors in any field for honors.

COTERMINAL BACHELOR'S AND MASTER'S DEGREES

The coterminal degree program allows undergraduates to study for the bachelor’s and master’s degrees concurrently in the same or in separate departments. 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 the end of 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 cotermination program, students must submit to the prospective department the following: cotermination 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 proposed graduate department.

The requirements for a cotermination 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 cotermination program with two 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 cotermination master's program may be used to meet the 36-unit University minimum requirement for the master's degree.

For cotermination 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, cotermination students are subject to graduate student policies and procedures, as described in the "Advanced 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 cotermination 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.

Authorization 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 separately by the deadlines given in the University Time Schedule and academic calendars. The master's degree must be conferred simultaneously with, or after, the bachelor's degree.

UNDERGRADUATE STUDY AT STANFORD

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 student's knowledge and awareness in each of the major areas of human knowledge, that significantly deepens understanding of one or two of these areas, and that prepares him or her for a lifetime of continual learning and application of knowledge to career and personal life.

The undergraduate curriculum at Stanford allows considerable flexibility. It permits each student to plan an individual program of study that takes into account personal educational goals consistent with particular interests, prior experience, 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. Guidance as to the limits within which that balance ought to be struck is provided by the University's Distribution Requirements and by the requirements 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 units and, in so doing, also complete the Writing Requirement, the Distribution Requirements, the Language Requirement, and the requirements 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 Distribution 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 understand the important “ways of knowing”—to assess their strengths and limitations, their uniqueness, 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 curriculum 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 limitations of requirements, students may freely choose any course for which previous studies have prepared them.

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.

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

**THE FRESHMAN WRITING REQUIREMENT**

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

All candidates for the bachelor’s degree, regardless of the date of matriculation, should satisfy the requirement during their first year at Stanford. Transfer students are individually informed at matriculation of their status with regard to the requirement.

The Writing Requirement can be satisfied in one of four ways:

1. English 1-2, a two-quarter sequence of composition 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 instructor.)

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.

3. Special writing instruction in connection with the Program in Cultures, Ideas, and Values; the Structured Liberal Education (SLE) track; or the English 7-8-9 track (Literature and the Arts).

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 Freshman Writing Requirement are designated DR: W in this bulletin.

**THE DISTRIBUTION REQUIREMENTS**

The Distribution 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 Distribution 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 Distribution Requirements in itself does not provide a student with an adequate general 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 Distribution 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.

The Committee on Undergraduate Studies (C-US), under the authority of the Senate of the Academic Council, certifies courses nominated by departments that fulfill the Distribution Requirements in the required areas of study. Information regarding specific courses that satisfy the Distribution Requirements and regarding individual student distribution status is available at the Office of the Registrar. Course planning and advising questions related to the Distribution 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. Specific details about course options are available at the Undergraduate Advising Center and in the Time Schedule; final choices should be made only after reviewing these details.

Students should be extremely careful to note which set of Distribution Requirements apply to them. The date of matriculation at Stanford determines which requirements apply to any individual student. Note that the requirements are measured in courses of at least 3 units each.

**CURRENT SYSTEM**

To fulfill the Distribution Requirements (DR), undergraduates who entered Stanford in Autumn Quarter 1991 and thereafter must take eleven courses certified for this purpose in nine areas as follows:

Three sequential courses in the Program in Cultures, Ideas, and Values. Students may not mix courses from different sequences for this requirement; students are encouraged to satisfy this requirement as early as possible, preferably in the first year;

One course in each of eight other subject areas that together embrace all areas of the undergraduate curriculum. See below for designated Areas numbered 2 through 9 and the following note on the Gender Studies requirement.

The subject areas of these Distribution Requirements (and corresponding notational symbols, found in the departmental course descriptions) are as follows:

**Area 1:** Cultures, Ideas, and Values (one three-course sequence) — DR:1

**Area 2:** World Cultures — DR:2

**Area 3:** American Cultures — DR:3

**Area 4:** Mathematical Sciences — DR:4

**Area 5:** Natural Sciences — DR:5

**Area 6:** Technology and Applied Sciences — DR:6

**Area 7:** Literature and the Fine Arts — DR:7

**Area 8:** Philosophical, Social, and Religious Thought — DR:8

**Area 9:** Social and Behavioral Sciences — DR:9

*Note* — At least one DR course must also be certified as concentrating on Gender Studies. The Gender Studies requirement is satisfied by completing one course from among those courses certified for Areas 2-9 and designated with a dagger, for example, DR:3†.

Courses certified as meeting the Distribution Requirements must carry a minimum of 3 units of credit. Normally, a single course is certified as fulfilling only one area of the Distribution Requirements. Exceptionally, a single course whose content is approximately equally divided between two areas of study may be certified as fulfilling either one of two Distribution Requirements. No single course may fulfill more than one Distribution Requirement for a given student.

For students who entered Stanford in Autumn Quarter 1991 and thereafter, courses that have been certified as satisfying the Distribution Requirements are identified by the symbols above. A comprehensive list of courses appears as an Appendix to this bulletin. This list indicates which courses fulfill the Distribution Requirements in effect beginning Autumn Quarter 1991-92, as well as the requirements in effect before Autumn Quarter 1991-92. Transfer students who entered Stanford prior to Autumn Quarter 1993-94 may elect to complete either the Distribution Requirements that went into effect Autumn Quarter 1991-92 or the set of requirements in effect before Autumn Quarter 1991-92. Students completing the Distribution Requirements in effect before Autumn Quarter 1991-92 should consult the Courses and Degrees bulletin appropriate to their year of entrance or seek the advice of the Registrar’s Graduation Assistant, room 131, Old Union.

**CREDIT TRANSFER**

For students who propose to use work taken at another college or university to satisfy a Distribution Requirement, 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.

**PETITION**

Students who have reason to believe their undergraduate program objectives are served by using some course or courses other than those specifically certified as satisfying the Distribution Requirements may present petitions, endorsed by their academic advisers, to the Academic Standing Office, room 100, Old Union.

**UNDERGRADUATES WHO ENTERED PRIOR TO AUTUMN 1991**

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 Courses and Degrees bulletin appropriate to the original entrance year or seek the advice of the Registrar’s Graduation Assistant, room 131, Old Union.
LANGUAGE REQUIREMENT

Undergraduates who entered Stanford in Autumn Quarter 1982-83 or thereafter are required to complete at least one year of college-level study in a foreign language. The basic requirement is met if the Office of Undergraduate Admissions determines that a student has completed the third year of high school language study, scored 600 or better in a Foreign Language Achievement Test, or scored 4 or 5 on the CEEB AP for a foreign language. The requirement may also be met if the Registrar's Transfer Evaluation Office determines that a student has completed one full year of college study in a foreign language. If a student has not completed the requirement prior to entrance, the alternative is to pass an examination administered by one of Stanford's language departments.

*Foreign Language Proficiency* — The notation "proficiency in (language)" will appear 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.

CREDIT

ADVANCED PLACEMENT

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 policies:

1. Generally, credit is given for an AP score of 4 or 5. Usually, 10 quarter units are awarded. No more than 10 quarter units may be given for performance in a single examination; occasionally, fewer than 10 are awarded for a score of 4 or 5. If the student has scores of 4 or 5 on two exams within the same language (for example, French Language and Literature), or within the same subject (for example, Music Theory and Music History), the student will be 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.

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. Undergraduate students who have attended other colleges or universities may transfer no more than 90 quarter units of credit for work done elsewhere toward a bachelor's degree from Stanford. Further information is available from the Office of the Registrar's Transfer Credit Evaluator, room 131, Old Union.

**POLICY**

<table>
<thead>
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<th>Test</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><strong>Political Sci.</strong> 1, 20 or above</td>
<td>5</td>
</tr>
<tr>
<td>U.S. History</td>
<td>4,5</td>
<td>—</td>
<td>10</td>
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<tr>
<td>Art History</td>
<td>4,5</td>
<td>—</td>
<td>10</td>
</tr>
<tr>
<td>Art (Studio)</td>
<td>4,5</td>
<td>—</td>
<td>10</td>
</tr>
<tr>
<td>Biology</td>
<td>4,5</td>
<td>Bio. 31 or above</td>
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<td>Chemistry</td>
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<td><strong>Political Sci.</strong></td>
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<td>1, 10, 22, or above</td>
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<td>Computer</td>
<td>5</td>
<td>**</td>
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<td>††</td>
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<td>Third year and above</td>
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<td>Based on Physics and Math. results</td>
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<td>Mech. only</td>
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E&M only

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<td>Based on Physics and Math results</td>
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<td>Based on Physics and Math results</td>
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<td>Take placement test</td>
<td>3</td>
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</table>

* Do not take Political Science 10.
† Do not take Political Science 20.
** Students must skip Computer Science 106 A/B and complete Computer Science 107, 109A, or 110 in order to receive 10 units.
†† Students must skip Computer Science 106 A and complete Computer Science 106B, 106X, or 193U in order to receive 5 units.
*** A combined score of 8 or more for both tests will receive 5 units.
††† Five quarter units if placed in Spanish second year, second quarter.

ACTIVITY COURSES

An undergraduate entering Stanford in September 1986 or thereafter may apply a maximum of 12 units in activity courses (Physical Education activity or Music activity) to the 180 units required for graduation. An undergraduate who entered Stanford prior to September 1986 is limited to a total of 12 units of Physical Education activity courses and a total of 24 units of ensemble Music courses that can apply toward graduation. The curriculum committee of the Department of Athletics, Physical Education, and Recreation and the Department of Music designate their respective activity courses.

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 Distribu-
tion 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 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 baccalaureate (A.B., B.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 declaration from the Registrar’s Office. If a student’s degree is formally amended to reflect more than a single major, the following requirements must be met:

1. The student must formally declare all majors to the Registrar’s Office.
2. The student must satisfy the requirements of each major.
3. Departments must certify that the courses the student proposes to satisfy the requirements of one major do not overlap with those of another declared major 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).

Students pursuing this option must complete a multiple major program sheet indicating which courses they plan to apply toward each major. To facilitate advance planning, this sheet is available at any time in the Graduation Office, room 131, Old Union.

When students attempt to meet but do not complete requirements on the basis outlined above, 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 be pursuing a single baccalaureate degree but may develop a course plan in which courses requisite for one major overlap with requirements for another. In other cases, the student seeking a single degree (for example, the B.S. in Physics) may complete requirements for a major appropriate to the other baccalaureate degree (the A.B., in this example) but may not wish to elect the B.A.S. A notation stating that those course requirements have been met will be noted on the transcript.

**LIMITS**

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

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 415-723-2426), 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 defend 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 established 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 Satisfactory/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.

UNDERGRADUATE ACADEMIC ADVISING

The Undergraduate Advising Center (UAC) provides and coordinates information and 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 the Axess computer system 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. Sophomores whose advisers are no longer advising use the advisers at the UAC until they declare a major. All undeclared transfer students are assigned an adviser by the UAC until they declare a major. 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. Sophomores, juniors, and seniors should continue to consult their advisers for planning of programs every quarter.

The UAC, located on the first floor of Sweet Hall, provides advising 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. A collection of graduate and undergraduate catalogs from other institutions is available, as well as reference guides to graduate and professional schools. Special programs run by the UAC are the Howard University and Spelman College Exchange Programs and the Women's Science and Engineering Network.

ADVANCED DEGREES

GENERAL REQUIREMENTS

For each Stanford advanced degree, there is an approved course of study which meets University and department requirements.

The minimum unit requirements for Stanford advanced degrees are described later in this section. When more than one advanced degree is received, each degree must represent at least 36 units not used to meet any requirement for another degree. The final units of a degree program, whether course work, directed reading, or research, must be completed at Stanford as a registered student.

Residency for an advanced degree is the time devoted to graduate study measured in tuition payments. The minimum residency requirement for an advanced degree is three full-tuition quarters or the equivalent in partial-tuition quarters.

Specific departmental degree requirements are provided in the “Graduate Programs” section of each department's listing of this bulletin. Opportunities for individually designed, interdisciplinary study at the doctoral level are described in the “Graduate Special Program” section of this bulletin.

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.

CONTINUOUS REGISTRATION

Graduate students must register for all three quarters of the academic year (Autumn, Winter, and Spring) until the degree is conferred. Course work and research are expected to be done on campus unless the department gives prior approval.
Registration is required for the quarter (or the quarter immediately preceding) in which a department project, thesis, or dissertation is submitted or in which an Application to Graduate is filed via AXESS for conferral of a graduate degree.

The following registration categories are available to 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. This status may be used for one quarter during a degree program.

2. **Terminal Graduate Registration (TGR):** doctoral students who have been admitted to candidacy, completed all required courses, accrued ten and one-half quarters of residency, and submitted a Doctoral Dissertation Reading Committee form may request Terminal Graduate Registration status to complete their dissertations. Students enrolled in master’s programs may qualify for TGR status upon completion of all required courses and three quarters of residency only if their program requires a thesis or departmental project. TGR status for the Engineer program may be obtained after admission to candidacy, completion of all required courses, and six quarters of residency.

A one-quarter TGR authorization is available to all graduate students who have fulfilled all unit and residency requirements for a graduate degree and who are returning after a leave of absence or reinstatement to register to take a University Oral Examination, submit a thesis or dissertation, or file an Application to Graduate for conferral of a degree. Doctoral students must meet the above criteria except that the residency requirement for one quarter TGR status is nine quarters instead of ten and one half.

3. **Graduate Final Requirement Registration:** graduate students who have 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. After the department reviews the student’s status to determine whether degree requirements will be completed for degree conferral or for TGR status with this final registration, submit the form to the Graduate Degree Section, Registrar’s Office.

Additional information on these registration categories is available from the Graduate Degree Section of the Registrar’s Office.

**CHANGES AND ADDITIONS OF DEGREE PROGRAMS**

Graduate students who wish to add a new higher degree program to be pursued simultaneously with a current degree program or change to a new degree program in the same or another department must submit a Graduate Program Authorization Petition. Doctoral students may file a master’s program proposal in lieu of a Graduate Program Authorization Petition for approval of a master’s degree in the same department. The petition is submitted directly to the department to which admission is requested.

Students who seek a degree in another department may also be required to submit a new graduate admissions application and statement of purpose. Departments may specify other application requirements, such as advanced subject GRE scores, letters of recommendation, current Stanford transcript, and statement of completion. An additional graduate application fee is not required. Verification of funding to complete the new degree objective is required for international students on non-immigrant visas changing departments or degree programs if the changes will lengthen their stay. Funding verification must specify availability of sufficient funds to complete the new degree objective.

**CONFERRAL OF DEGREES**

The Application to Graduate is filed through AXESS, the on-line service which allows students to view and update parts of their central administrative/academic student records. This initiates approval for conferral of all graduate degrees. 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. Requests for conferral are reviewed by the Graduate Degree Section, Registrar’s Office, and the student’s department to verify completion of degree requirements. 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.

The Graduate Degree Section of the Registrar’s Office should be notified in writing when conferral plans change. Students who withdraw their conferral request or who fail to complete degree requirements must file a new Application to Graduate through AXESS in a subsequent quarter when they are ready to graduate. A new Application to Graduate must be filed for each degree and conferral quarter.
MASTER OF ARTS AND MASTER OF SCIENCE

Upon recommendation to the Senate of the Academic Council by the faculty of the major department and by the Committee on Graduate Studies, the degrees of Master of Arts (A.M.) and Master of Science (M.S.) are conferred on students who have satisfactorily completed at least three full-tuition quarters of residency as graduate students in the University and have fulfilled other requirements prescribed by the schools or departments concerned. The University minimum unit requirement for the A.M. or M.S. degree is 36 units earned at Stanford as a graduate student. Most departments require more. Of the 36-unit minimum, 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 specifications may be higher. Up to 9 units of work done as a graduate student at another university may be used to meet department requirements that exceed the 36-unit minimum; in these cases, the residency requirement of three full-tuition quarters remains unchanged.

In the first quarter of enrollment in a master’s program, the departments assign advisers to master’s students to assist them in planning coherent programs of study that include components to synthesize material covered and to allow for some degree of depth. Depending on the field of study and departmental interests, such a component could be a thesis, a project, a long paper, a final examination, a sequencing of course work, seminars, or a research requirement. The student’s master’s program is outlined on the Program Proposal for a Master’s Degree, which must be approved in the department by the end of the first quarter. Authorization to register for master’s programs expires three years from the first quarter of enrollment in the program. Extensions beyond the third year require review of academic progress and approval by the department.

If a thesis is a degree requirement, it must bear the approval of the adviser under whose supervision it was prepared and must be submitted to the department on or before the department’s specified deadline. A fee may be charged for binding copies of the thesis.

A second Stanford master’s degree requires an additional 36 unduplicated units and three full-tuition quarters of residency.

MASTER OF ARTS IN TEACHING

Upon recommendation to the Senate of the Academic Council by the faculty of the School of Education and by the Committee on Graduate Studies, the Master of Arts in Teaching (M.A.T.) is conferred on candidates who have completed at least three full-tuition quarters of residency as graduate students at the University and who have fulfilled other requirements prescribed by the School of Education and by one of the academic departments participating jointly in the program. The program is designed for experienced teachers or for individuals who have previously completed programs of teacher preparation.

MASTER OF FINE ARTS

Upon recommendation to the Senate of the Academic Council by the faculty of the Department of Art and by the Committee on Graduate Studies, the degree of Master of Fine Arts (M.F.A.) is conferred on candidates who have satisfactorily completed at least three full-tuition quarters of residency, 36 units of study, and other requirements described in the “Art” section of this bulletin.

MASTER OF BUSINESS ADMINISTRATION

Upon recommendation to the Senate of the Academic Council by the faculty of the Graduate School of Business and by the Committee on Graduate Studies, 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 University. (Full particulars concerning these requirements are found in the Graduate School of Business pamphlet.) For students concurrently pursuing an A.M. or M.S. and an M.B.A. degree, the number of units and amount of residency beyond that required for the M.B.A. is determined by the A.M. or M.S. department.

EDUCATIONAL SPECIALIST

Upon recommendation to the Senate of the Academic Council by the faculty of the School of Education and by the Committee on Graduate Studies, the degree of Educational Specialist (Ed.S.) is conferred on candidates who have completed three full-tuition quarters of residency and a program of study, as outlined on the Application for Candidacy, of 45 units of course work at Stanford beyond a master’s degree (or its equivalent). A field-based project is also required.

ENGINEER

Upon recommendation to the Senate of the Academic Council by the faculty of the major department and by the Committee on Graduate Studies, the degree of Engineer is conferred on candidates who have been admitted to candidacy and who have satisfactorily completed a minimum of three full-tuition quarters of residency.
and 36 units at Stanford beyond the master's degree. A thesis is required.

Three copies of the thesis, bearing the approval of the adviser under whose supervision it was prepared, must be submitted to the Graduate Degree Support Section of the Registrar's Office on or before the quarterly deadline indicated in the University's academic calendar. A fee is charged for binding copies of the thesis.

**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.

Upon recommendation to the Senate of the Academic Council by the faculty of the School of Law and by the Committee on Graduate Studies, the M.L.S. degree is conferred upon candidates who, in not fewer than two academic terms in residence and in no 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 EDUCATION**

Upon recommendation to the Senate of the Academic Council by the faculty of the School of Education and by the Committee on Graduate Studies, the degree of Doctor of Education (Ed.D.) is conferred on candidates who have satisfied the requirements of the School of Education and the University. See the "Doctor of Philosophy General Regulations" section that directly follows in this bulletin.

**DOCTOR OF MUSICAL ARTS**

Upon recommendation to the Senate of the Academic Council by the faculty of the Department of Music and by the Committee on Graduate Studies, the degree of Doctor of Musical Arts (D.M.A.) is conferred on candidates who have satisfied the requirements of the faculty of the Department of Music and the University. Information on the requirements for the D.M.A. and the Ph.D. in Music may be found in the "Music" section of this bulletin. Also see the "Doctor of Philosophy General Regulations" section of this bulletin. Four unbound copies of the final project for the D.M.A. must be submitted to the Graduate Degree Section of the Registrar's Office on or before the quarterly deadline indicated in the University’s academic calendar. A fee is charged for binding copies of the project.

**DOCTOR OF JURISPRUDENCE**

Upon recommendation to the Senate of the Academic Council by the faculty of the School of Law and by the Committee on Graduate Studies, 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.

**MASTER OF THE SCIENCE OF LAW**

Upon recommendation to the Senate of the Academic Council by the faculty of the School of Law and by the Committee on Graduate Studies, 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. Full particulars concerning requirements may be found in the Stanford University bulletin Law School.

**DOCTOR OF THE SCIENCE OF LAW**

Upon recommendation to the Senate of the Academic Council by the faculty of the School of Law and by the Committee on Graduate Studies, 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 University and the School of Law.

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

Upon recommendation to the Senate of the Academic Council by the faculty of the School of Medicine and by the Committee on Graduate Studies, the degree of Doctor of Medicine (M.D.) is conferred on candidates who have satisfactorily completed the required curriculum in medicine. All requirements for the M.D. degree are given in the Stanford University School of Medicine Catalog.

DOCTOR OF PHILOSOPHY

GENERAL REGULATIONS

Upon recommendation to the Senate of the Academic Council by the faculty of the major department or program and by the Committee on Graduate Studies, 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.

Candidates for the Ph.D. degree must satisfactorily complete a three-year program of study that includes 72 units of graduate course work and research done at Stanford and nine full-tuition quarters of residency. To promote diversity and depth in the doctoral program, at least 3 units must be taken with each of four Stanford faculty members. A doctoral program may include a master’s or an Engineer degree. However, the minimum requirements for a doctoral degree taken after another Stanford advanced degree are three full-tuition quarters of residency and 36 units of unduplicated work.

A maximum of three quarters of residency based on 36 units of work done as a graduate student elsewhere may be applied to the Stanford doctoral program requirements. Although the residency requirement may be reduced to six quarters, the 72 units of course work and research must be done at Stanford. Students can apply for residency credit for prior graduate work only after the first quarter at Stanford. Students who wish to receive credit for graduate work done at another institution during the course of their Stanford program must receive prior approval.

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 for the Ph.D. Students are expected to complete departmental qualifying procedures and apply for candidacy by the end of the second year of doctoral study. The Application for Candidacy specifies a departmentally approved program of study to fulfill degree requirements. If the program includes a minor, approval by the department awarding the minor is also required. Doctoral students are expected to complete their degree requirements within the time limits specified in this publication. Candidacy is valid for five years unless terminated by the department for unsatisfactory progress. Extensions of candidacy 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 departmental sections of this bulletin.

FOREIGN LANGUAGE REQUIREMENT

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

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 major department. All members must be on the Stanford Academic Council. In a case where the third member is not on the Academic Council, approval must be given by the department chair. (Approval for appointment of a reader who is not on the Academic Council may be given if that person is particularly well-qualified to consult on the dissertation topic.)

Former Stanford Academic Council members may serve on a reading committee. However, if they are to serve as principal dissertation adviser, the appointment of a co-adviser who is currently on the Academic Council is required. This is to ensure representation for the student in the department by someone playing a major adviser role in completion of the dissertation. The reading committee 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, whichever comes first in the student’s program. 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.

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 during the doctoral program the oral examination is taken. It may be a test of knowledge of the field, a review of a dissertation proposal, or a defense of the dissertation.

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. (Permission 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. However, a courtesy appointment does not affect eligibility. The chair can be from the same department as any other member(s) of the examination committee. The chair 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 Schedule must be submitted to the departmental 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.

Responsibility for selecting 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 to participate in the process of selecting 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. Within thirty days and after discussion with the student, adviser, and appropriate faculty members, the chair of the student's major department must send the student a written statement indicating the final action of the department.

DISSERTATION

The doctoral dissertation is expected to be an original contribution to scholarship or scientific knowledge and to exemplify the highest standards of disciplines. 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 normally granted only for cases in which the other language or literature in that language is also the subject of the discipline. Dissertations written in another language must include an extended summary in English.

Directions for preparation of the dissertation and abstract are available from the Graduate Degree Support Section of the Registrar's Office. Four copies of the dissertation and an abstract of less than 350 words must also be submitted to the Graduate Degree Support Section on or before the quarterly deadline indicated in the University's academic calendar. Two copies of the bound dissertation are sent to the Stanford University Library, and one copy goes to the major department. A fourth copy is sent to University Microfilms, Inc., in Ann Arbor, Michigan, from which microfilm copies may be ordered. Additional copies for personal use may be submitted for binding. A fee is charged for microfilming, binding copies of the dissertation, and for publishing the abstract.

Ph.D. MINOR

A minor may be offered by any Ph.D. granting department or program. Doctoral students from other departments or programs may pursue minors to complement their Ph.D. programs. 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 in conjunction with the minor department and the Ph.D. department.

The minimum University requirement for a Ph.D. minor is 20 units of course work at the graduate level. All of the course work for a minor must be done at Stanford. Courses used for a minor
may not also be used to meet 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.

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.

RESIDENCY

The residency requirement is a feature of graduate education with which many entering students will not be familiar. 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: three quarters for a master's degree, six for an Engineer or Educational Specialist degree, and nine for a doctoral degree. Where more than one advanced degree is pursued, the residency requirement for each degree is at least three full-tuition quarters.

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 this University. The required minimum amount of academic work carried out at Stanford is defined in terms of quarters rather than units so as to encourage students not to overload themselves and rush through their program, but rather to do full justice to each course they take and in each to do the very best work of which they are capable.

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 satisfies his or her other degree requirements before completing the residency requirement. 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 status. Registration for 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. The table below outlines the minimum University requirements for each advanced degree and combination of degrees.

RESIDENCY CREDIT FOR GRADUATE WORK DONE ELSEWHERE

After at least one quarter of enrollment, students may apply for validation of work done as a graduate student at another university for residency credit at Stanford. Course work done prior to conferral of the bachelor’s degree may not be used for graduate residency transfer credit. A maximum of three quarters of residency credit equivalent to 36 units of course work may be validated to meet requirements for an Engineer or Ph.D. degree. (The residency requirements for a master's degree may not be reduced except that the department may validate work done elsewhere to meet course requirements above the 36-unit University minimum.) The Application for Residency Credit for Graduate Work Done Elsewhere is reviewed by the department and the Graduate Degree Support Section of the Registrar's Office. Courses taken elsewhere may be used in place of department requirements at the discretion of that department. Prior approval must be obtained for graduate work at another institution during the course of the Stanford program. Residency transfer credit is awarded for work done as a graduate student or in a category that yields graduate credit.
### RESIDENCY REQUIREMENTS

<table>
<thead>
<tr>
<th>Degree</th>
<th>Min. # of Units</th>
<th>Min. # of Full. Tuition Qtrs.</th>
<th>Max. Reduction of Residency Requirement for Graduate Work Done Elsewhere (in Qtrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.M.</td>
<td>36-45</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>M.S.</td>
<td>36-45</td>
<td>see note 2</td>
<td>0</td>
</tr>
<tr>
<td>A.M. or M.S. in C-terminal Program</td>
<td>36-45 unduplicated units beyond A.M. / M.S.</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>A.M./M.S.</td>
<td>36-45 unduplicated units beyond first A.M./M.S.</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Engineer plus one A.M./M.S. from Stanford</td>
<td>36-45 unduplicated units beyond first A.M./M.S.</td>
<td>6</td>
<td>0</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>Ed.S. plus one Ph.D. from Stanford</td>
<td>45 unduplicated units beyond A.M./M.S. plus 36 for Ph.D.</td>
<td>9</td>
<td>3; 0 if A.M./M.S. completed at Stanford</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 one Stanford A.M./M.S.</td>
<td>72 units (36 unduplicated for each degree)</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>plus two Stanford A.M./M.S.</td>
<td>108 units (36 unduplicated for each degree)</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>M.D.</td>
<td>204 units</td>
<td>13 Med. School qtrs.</td>
<td>3 qtrs. and 54 units for other Med. School work (transfers); 6 qtrs. and 108 units for other Med. School work</td>
</tr>
<tr>
<td>plus one M.D. plus 36 units for Ph.D. from Stanford</td>
<td>36 units plus min. 3 for Ph.D.</td>
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<td>0</td>
</tr>
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<td>plus one M.D. plus 36 units for Ph.D. from Stanford</td>
<td>36 units plus min. 3 for Ph.D.</td>
<td>9</td>
<td>0</td>
</tr>
</tbody>
</table>

**Note 2:**
- A.M./M.S. is completed at Stanford
- A.M. completed at Stanford
- M.S. completed at Stanford
- 6 qtrs. and 108 units for other Med. School work
- A.M./M.S. completed at Stanford
- 36 units plus min. 3 for Ph.D.
42 DEGREES

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

J.D. 68 additional law units beyond first semester
J.D. requirement plus 6 Law School semesters
J.D. requirement plus 36 semesters
J.D. requirement plus 36 unduplicated units
J.D. requirement plus 6 semesters

M.D. requirement plus MBA and 6 qtrs.
M.B.A. requirement

M.D. units plus 204 School qtrs.
M.D. units plus 13 Med. School qtrs.
M.D. units plus 36 Law School semesters
M.B.A. requirement plus 36 units if pursued sequentially
M.B.A. requirement plus 36 unduplicated units
M.B.A. requirement plus 36 units for A.M./M.S.

M.B.A. requirement plus any additional residency
M.B.A. requirement plus 36 unduplicated units if pursued concurrently
M.B.A. requirement plus 15 full tuition quarters
M.B.A. requirement plus 15 full tuition quarters beyond the quarter in which 180 units were completed.

M.B.A. 100 units plus 9 min. unduplicated units
M.B.A. 100 units plus 36 unduplicated units
M.B.A. 100 units (84 in GSB) plus 9 min. unduplicated units
M.B.A. 100 units (84 in GSB) plus 30 GSB qtrs.
M.B.A. 100 units (84 in GSB) plus 12 GSB qtrs.
M.B.A. 100 units (84 in GSB) plus equivalent

M.B.A. requirement plus J.D. requirement

M.B.A. requirement plus 6 GSB qtrs.
M.B.A. requirement plus 204 M.D. School qtrs.

M.B.A. requirement plus any additional residency
M.B.A. requirement plus 36 unduplicated units
M.B.A. requirement plus 36 units if pursued sequentially
M.B.A. requirement plus 36 units for A.M./M.S.

M.B.A. requirement plus any additional residency
M.B.A. requirement plus 36 unduplicated units
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M.B.A. requirement plus 36 units for A.M./M.S.
LEAVES OF ABSENCE

Students who wish to interrupt their registration may request, in advance of departure, a leave of absence for up to one year. The leave of absence must be approved by the chair or director of graduate studies of the student’s major department and the International Center if the student is in the United States on a visa. Leaves are normally granted for a maximum of one calendar year for academic or personal reasons, for example, use of library, museum, or laboratory facilities available elsewhere, or the opportunity to gain teaching experience, maternity leave, financial necessity, or health. Leaves requested for a longer period will be approved only in exceptional circumstances (such as mandatory military service). An extension of leave (maximum of one year) for students in master’s programs or for doctoral students not yet admitted to candidacy, will be approved only in very unusual circumstances. Advanced doctoral students are required to submit a dissertation progress report with the request for extension of leave. A request for a leave of absence beyond the expiration of candidacy must be accompanied by an Extension of Candidacy form approved by the department.

REINSTATEMENT

Students who do not register for a quarter during the academic year and do not take an approved leave of absence must apply for reinstatement to reenroll in the University. The reinstatement procedure is required for students who wish to return to the same degree program in which they were previously enrolled. A fee is required. Reinstatement applications must be submitted by the first day of the quarter for which reenrollment is requested. Information on application requirements is available from Graduate Admissions, Registrar’s Office. Decisions on reinstatement are made by the department or program in which enrollment is requested.

RESIGNATION

Students who wish to terminate study in a program should submit a letter of resignation to the relevant department. Students should indicate the graduate program from which they wish to withdraw and the date the action is to become effective. A student who has resigned and later wishes to return to Stanford must apply for reinstatement.
THE UNIVERSITY YEAR

The University year begins on the Monday falling between September 23 and September 29, inclusive, and is continuous throughout four quarters. Autumn, Winter, and Spring Quarters are approximately eleven weeks long. Except in certain programs, the Summer Quarter is eight weeks long. Any three quarters constitute an academic year.

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.

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 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

A student may register for each quarter by mail, in person, or by using the Axess computerized registration system. 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, the student will turn in to the Registrar's Office, via Axess, a Study
List containing his or her official list of courses for the quarter.

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

For full registration procedures, see the quarterly Time Schedule.

Transcripts — Transcripts of Stanford records are issued by the Registrar's Office upon the written request of the student. There is no charge for official transcripts. Transcripts may be ordered at the Transcripts Window in the Old Union or by using the on-line Axess system. The office attempts to maintain a seventy-two-hour service, but at certain times, such as from the start of final examinations until grades are recorded, there may be a two-week delay. The University reserves the right to withhold transcripts or records of students with unmet obligations to the University or to the Stanford Bookstore.

PRIVACY

Stanford University policies regarding the privacy of student records comply with the federal Family Rights and Privacy Act of 1974 (Buckley Amendment) and in some respects go beyond the requirements of the law. The University regards the following items of information as "directory information," that is, information available to any person upon specific request:

- Student name
- Sex
- Class status
- Major
- Directory address and phone number
- Electronic mail address
- Institution attended immediately prior to Stanford
- Mailing address
- Office address (for graduate students)
- Office phone number (for graduate students)
- Residence assignment and room or apartment number
- Secondary mailing or permanent address
- Specific quarters or semesters of registration at Stanford
- Stanford degree(s) awarded and date(s), degree major(s), and field(s), if any
- Stanford student identification number
- University degree honors

It is Stanford's policy that, apart from "directory information," no one, except individuals with a legitimate educational interest or "need-to-know" and acting on behalf of the University, is authorized to obtain personally identifiable information from a student record without written consent of the student. The only exceptions would be in response to legal compulsion by subpoena. The University considers an individual to have a legitimate educational interest in student records when access is necessary or useful to him or her in carrying out duties and responsibilities involving the students.

At the beginning of each academic year, individual students have the opportunity to request the University to hold private information that otherwise would be regarded as "directory information." Requests or modifications to Privacy Requests should be made by using the on-line system, Axess. Once filed, the request remains in effect until it is modified or revoked. No other information (for example, specific courses of study) is available except upon release by the student or in response to subpoena.

In cases involving subpoena, the Office of the Registrar will attempt to notify the student before the University provides information from his or her record. Students wishing to review records about themselves held by the Office of the Registrar should contact Roger Printup, Registrar, room 133, Old Union.

Students, faculty, and others with policy questions or with concerns regarding the security of, or access to, student records also should contact the Registrar.

ADDING AND DROPPING COURSES

When a Study List has been filed, a student may add courses until four weeks prior to the last day of final exams. Generally, courses or units may be added only if the revised program remains within the normal load limits.

Until the beginning of the last four weeks of the quarter, students may add units of credit to a fixed-unit course provided the student's total registration does not exceed the normal load limits. The increase, subject to the approval of the instructor, may be up to 100 percent of the published unit value of the course.

Students are permitted to drop courses by:

1. Using the course-drop function of the on-line Axess system by 11:59 p.m. on the last day of Dead Week, or
2. Submitting a course-drop petition form to the Registrar's Office before 4:00 p.m. on the last business day of Dead Week, or
3. Submitting to the instructor or instructor staff, up to the beginning of the scheduled final examination period (for courses that have in-class final examinations), a written request that an NC (no credit) be given for the course, thereby dropping the course form the student transcript.
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 supplemented by systematic outside reading or experiment under the direction of the instructor, a reduction may be made in the actual drawing, field, laboratory, or classroom time as seems just to the department.

REPEATED COURSES

Students should not take courses for credit for which they received either Advanced Placement credit or transfer credit. Some Stanford courses may be repeated for credit, as specially noted in this bulletin; most courses may not be repeated for credit.

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. The maximum is 18 units. Although 20 units are routinely approved, that number may be exceeded only for compelling reasons. A past superior academic performance will not be considered to be sufficient justification for exceeding this number. Petitions for excess programs must be signed by the student’s adviser. Such petitions will be referred 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 at Stanford.

AUDITING

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

Persons not registered at Stanford are permitted to audit only under unusual circumstances; permission may be granted by the Registrar’s Office, and payment of the Permit to Attend tuition of $1,540 per quarter is required.

Stanford alumni and their spouses may register on the Permit to Attend basis on request and upon payment of the required tuition.

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

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. Spouses of University faculty and staff may audit lecture courses. In both of the above cases, a courtesy card should be obtained from the Registrar’s Office. In all cases of auditing, the instructor’s consent is required.

No person should attend any class unless he or she is in one of the classifications described above.

LEAVE OF ABSENCE FOLLOWING REGISTRATION

A Leave of Absence petition must be filed when a student interrupts a period of instruction for which he or she has registered, or for a quarter for which he or she has registered in advance and does not wish to attend. If a leave of absence in the current quarter is desired on account of sickness, the petition must be endorsed by an authorized Cowell Health Center representative. In such cases, the student must obtain clearance from the Health Center when he or she wishes to return.

An undergraduate student in good standing who is absent one or more quarters may reenter at the beginning of any quarter without formal petition. Graduate students, see the section “Leaves of Absence for Graduate Students” of this bulletin. For an explanation of refunds, see the section “Refunds” of this bulletin.

VERIFICATION OF DEGREES

The degree is conferred at the end of the quarter in which the requirements are met, but diplomas are issued and Commencement exercises are held only in June.

The Registrar’s Office provides verification of degrees, after conferral, via an official transcript, a verification letter, or a telephone confirmation. Requests for official transcripts must be made in writing or through Axess. Requests for telephone confirmation of degrees are generally completed at the time of the phone inquiry.
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.

DEAD WEEK POLICY STATEMENT

Dead Week is a period 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, Dead Week 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, Dead Week 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 Dead Week, 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 Dead Week 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 Dead Week laboratory session(s) 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 Dead Week.

Take-home final examinations, given in place of the officially scheduled in-class examination, may be distributed in Dead Week. 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 Dead Week. This policy preserves the instruction time for courses and protects students' opportunities for extensive review and synthesis of their courses.

During Dead Week, 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.

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 Dead Week, 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 examination 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.

Students who believe that there are faculty who are violating Dead Week policy should contact the Registrar’s Office.

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 and are not available.

DEFINITION AND EXPLANATION

A Exceptional performance
B Superior performance
C Satisfactory performance
D Minimal pass

Plus (+) and minus (-) may be used as modifiers with the above letter grades.

L Pass, letter grade to be reported
+ Student-elected Satisfactory (A, B, or C)
S No-option Satisfactory (A, B, or C)
N Continuing course
I Incomplete
NC No credit
* No grade reported

L A temporary notation that represents creditable completion of a course for which the student is to receive a letter grade. 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." The permanent letter grade is due before the start of the next quarter.

+ In a course for which some students will receive letter grades, the "+" represents performance that is satisfactory or better when the student has elected the "+" option. This option is available in any course, subject only to the consent of the instructor and department and observance of the time limit. The option of declaring or dropping the "+" by the student must be recorded on the student's Study List by the end of the third week of the quarter.

S For a course in which an instructor elects to grade a course only on a Satisfactory 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 "+.")

There is no limit applicable to all students on the number of "+" or "S" courses that a student may take. A department may limit the number of Satisfactory courses to count for a major program. 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.

N The "N" indicates that the student's course 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.

I The "I" is restricted to cases in which the student has satisfactorily completed a substantial part of the course work. The time limit for satisfactory completion of the course work will be determined by the instructor, but for courses taken in 1994-95 or later may not be more than one calendar year from the date of the final examination in the course in question. No credit is given until the course is completed and a passing grade received. The "I" grade is not changed in a student's record until another grade is received from the instructor or, in a 1994-95 or later course, if a year elapses after the final exam without receipt of a grade. In the latter case, the "I" will automatically be converted to a NC or NP as appropriate. A passing grade removes all reference to the initial "I" grade. A no credit (NC) received from the instructor will be treated the same as an initial "NC." A student may petition that a course with an "I" grade be removed from his or her record.

NC The symbol "NC" (meaning no credit) should be used by instructors in lieu of a grade whenever a student, for whatever reason, is not entitled to credit. No reference to the course or grade will appear on a student's transcript, but the course and "NC" symbol will appear on the student's quarterly grade report, will be visible to Stanford administrative staff, and will be held in the records of the Registrar. The sole academic penalty for failure to complete a course satisfactorily is the loss of credit toward graduation. Tuition fees are not recoverable in such cases.

* When an instructor is unable to record any other grade or symbol, the instructor may record the course and the asterisk, which will appear on the student's record. 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, "*" will show as the grade for the course on a student's transcript. The "*" symbol will remain in the record until changed.

Please note that several changes to the general University grading system have been approved for 1995-96. See the "Changes to Grading Policy Adopted June 1994" section below.

**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.

Grades for students not on an instructor's End-Quarter Report will be submitted on Supplementary Report/Grade Change Notice forms.

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 to say, 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 based on the grading of part of a specific piece of work (for example, part of a test) on the basis of the guidelines for Student Academic Grievance Procedures section of this bulletin).

CHANGES TO GRADING POLICY
ADOPTED JUNE 1994

The following changes were adopted by the Faculty Senate on June 2, 1994 and will be effective Autumn Quarter 1995-96.

1. Add/Drop and other Deadlines:
   a) Courses may be added up to the end of the third week of classes. (Faculty may continue to close their classes to new enrollments at an earlier date if they so choose.)
   b) If a course is dropped prior to the end of the fourth week of classes, no record of the course will be kept.
   c) If a course is dropped between the beginning of the fifth week and the end of the eighth week, a notation of 'W' (withdraw) will appear on the transcript. If a student has not officially withdrawn by the end of the eighth week of classes, a grade will appear.
   d) Students will have until the end of the sixth week of classes to declare the grading option (letter grade or satisfactory/no credit basis) for a course.
   e) A notation of 'I' (incomplete) will be assigned only when a student makes the appropriate arrangements with the professor by the last day of classes.

2. Recording Courses not Passed:
   a) If a student has not officially withdrawn from a course by the end of the eighth week of classes, a record of the course will appear on the transcript.
   b) A new notation of 'NP' (not passed) will be used in recording courses taken for a letter grade that are not passed. ('NC' will continue to be use as the analogous notation for courses taken on a satisfactory/no credit basis.)

3. Course Retake Policy:
   a) A student may retake once any course she or he completed or from which she or he withdrew, and have the original grade or notation replaced by the notation 'RP' (repeated course). The student must register for the same number of units for that particular course in the quarter in which the course is retaken. Upon completion of the retake, the first occurrence will be changed to 0 units and the notation 'RP' will be substituted for the original grade; the units will appear with the second occurrence, and the corresponding grade will be accompanied by an asterisk to indicate that it is a repeated course.
   b) A student may retake a course a third time only if she or he received a 'NP' or 'NC' the second time. Both the second and third grades will appear on the transcript, annotated with asterisks to indicate they are repeated courses, and the third occurrence will be shown as 0 units.
4. Incompletes:
   a) Incompletes must be cleared within one year (that is, prior to the first day of the first quarter, including Summer Quarter, following assignment of the ‘I’ notation); otherwise the notation will be changed automatically to ‘NP’ or ‘NC,’ depending on the grading option.

5. Implementation and Transition Period:
   a) The new policies will be implemented in full starting Autumn Quarter of the 1995-96 academic year.
   b) During the 1994-95 academic year, current policies (including up-to-the-final-exam drop deadlines and no recording of failing grades on the transcript) continue to operate with the following minor restrictions: (1) retakes under the current policy are restricted to courses taken prior to or during the 1993-94 academic year (including Summer 1994); retakes of courses taken in the 1994-95 academic year would be recorded using the new policy. (2) A student may petition for the removal from the transcript of courses with ‘I’ notations only for those accrued prior to or during the 1993-94 academic year.

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:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Numerical Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>4.3</td>
</tr>
<tr>
<td>A</td>
<td>4.0</td>
</tr>
<tr>
<td>A-</td>
<td>3.7</td>
</tr>
<tr>
<td>B+</td>
<td>3.3</td>
</tr>
<tr>
<td>B</td>
<td>3.0</td>
</tr>
<tr>
<td>B-</td>
<td>2.7</td>
</tr>
<tr>
<td>C+</td>
<td>2.3</td>
</tr>
<tr>
<td>R</td>
<td>2.2</td>
</tr>
<tr>
<td>F</td>
<td>2.1</td>
</tr>
</tbody>
</table>

"N" is a temporary notation used in a continuing course; it will be 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.

GRADUATE SCHOOL OF BUSINESS

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

   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.)

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 will become 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.
ACADEMIC POLICIES AND STATEMENTS

ACADEMIC STANDING

UNDERGRADUATES

All undergraduate students are expected to make normal progress toward completing 180 units in four years (twelve quarters).

Units are granted for courses completed with grades "A," "B," "C," "D," "Satisfactory" (+ 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.) All academic quarters (except a Summer Quarter's registration of 11 units or fewer) in which the student is registered shall be counted as a quarter of enrollment for the purpose of academic standing unless the Subcommittee on Academic Standing, Petitions, and Exceptions, acting upon a petition for fewer than 12 units, stipulates otherwise.

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 end-quarter 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 end-quarter 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

Students who fail to complete a minimum of 12 units of new course work by the end of the end-quarter examination period in any quarter of registration while on probation are liable for suspension. Under certain circumstances, they may be permitted to apply for the status of provisional registration by petition to the Subcommittee. If provisional registration is granted, it will be accompanied by a clear and precise statement of the conditions under which it is given. In making its determination as to whether to grant the provisional registration, the Subcommittee shall consider the written petition of the student and, unless impossible or inappropriate, the endorsement of the student’s academic adviser and, in some instances, the endorsement of a member of the University counseling staff.

SUSPENSION

Students who are not granted provisional registration by the Subcommittee, or who are eligible to apply for provisional registration and do not do so, or who fail to fulfill the conditions of their provisional registrations, shall be placed on academic suspension.

Students on suspension for the first time may apply by petition for provisional registration to return to the University. Provisional registration under these circumstances will normally be granted, at the earliest, for the academic quarter that begins at least eleven months after the date of suspension.

Students who have returned to the University after having been on academic suspension and are again placed on suspension may submit a petition for provisional registration to return to the University. Provisional registration will normally be granted, at the earliest, for the academic quarter that begins at least thirty-five months after the date of suspension.

NOTIFICATION

Written notices that students are on probation or suspension or that they have been granted provisional registration will be sent to the students and to the students’ academic advisers as soon as practicable after the close of the academic quarter in question.

PETITIONING

Students who have been suspended and believe they have a compelling reason to appeal their suspension, without a break in enrollment, must submit a properly endorsed petition for provisional registration by the end of the first week of the desired quarter of return. Petitions submitted after this deadline are not considered.

Students who have been suspended and wish to return after their suspension (one year or three years) or who desire to return early from suspension must submit a properly endorsed petition for provisional registration by the end of the first week of the desired quarter of return. Petitions submitted after this deadline are not considered. Students applying for financial aid and/or on-campus housing should be mindful of deadlines and procedures for those offices.

Any question concerning academic standing or the petitioning process should be referred to the Academic Standing Adviser, room 100, Old Union.
GRADUATE STUDENTS
ACADEMIC PROGRESS REQUIREMENTS*

Master's degree students are required to submit a program proposal during the first quarter, and coterminal students during the first quarter after completion of 180 units; their degree programs are authorized for three years (five years for Honors Cooperative students) from the first quarter of enrollment.

Engineer degree students are required to be admitted to candidacy by the end of the second quarter in the program; candidacy is valid for five years.

Doctoral degree students (Ph.D., D.M.A., Ed.D.) are expected to be admitted to candidacy by the end of the second year in the program. Candidacy is valid for five years.

* These guidelines apply to all matriculated graduate students except those enrolled in the Schools of Business or Law and in the M.D. program in the School of Medicine. The standards for students in professional degree programs are described in bulletins for the Schools of Business, Law, and Medicine. Students in other degree programs must meet the minimal standards of progress listed below.

UNIT REQUIREMENTS FOR MINIMAL PROGRESS

Graduate students registered at full tuition must enroll for at least 11 units and must pass a total of 24 units in three quarters, normally at least 8 units in a quarter. Those registered at 9 units must pass a total of 18 units in three quarters, normally at least 6 units in a quarter. Students with permission to register for 8 units or less must complete a proportionate number of units. Department guidelines that set higher standards take precedence over the University policy.

Advanced doctoral students who have completed formal course work must register for directed reading or research units and receive a satisfactory grade each quarter from their advisors or sponsors.

Students identified as not meeting the requirements for minimal progress will be reviewed by their departments to determine whether the problem lies with administrative matters such as reporting of grades or with academic performance. Students will 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.

Graduate students registered in Terminal Graduate Registration (TGR) status must enroll in the TGR course (801 for master's and Engineer programs or 802 for doctoral programs) in his or her department with the adviser as the instructor. An 'N' grade signifying satisfactory progress must be received each quarter to maintain registration privileges. An 'N-' grade indicates unsatisfactory progress. The first 'N-' grade constitutes a warning. The adviser, department chair, and student should discuss the deficiencies and the steps necessary to correct them. A second consecutive 'N-' grade will result in a hold on future registration. Future registration is permitted only when a written plan for completion of degree requirements has been reviewed and approved by the department. Subsequent 'N-' grades are grounds for dismissal from the program.

GUIDELINES FOR DISMISSAL 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.

The principal condition for continued registration is satisfactory academic progress. 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 adviser) will:

1. 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 in the students' files.

4. Provide students the opportunity to examine their departmental files.

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 departmental decisions safeguard the rights of both students and faculty.

* Approved by the Senate of the Academic Council, May 13, 1982, and amended October 1986 by the graduate division to reflect changes in master's programs. These guidelines apply to all matriculated graduate students except those enrolled in the Schools of Business or Law and in the M.D. program in the School of Medicine. Guidelines for dismissal of students in these programs are issued by the individual school.
BEFORE CANDIDACY

A department committee may vote to dismiss a student who is clearly not making academic progress before review for admission to candidacy. The committee should meet with the student to discuss his or her academic performance and how to correct deficiencies before considering dismissal.

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

Candidacy for a graduate degree expires after five calendar years. Students who do not complete their degree requirements within this time must apply for an extension of candidacy to maintain registration privileges. The department may approve an extension for a specific period of time or initiate proceedings for dismissal (as described below). Candidacy is extended only after approval by the department or school of a detailed plan for completing degree requirements.

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 departmental file. The summary should specify the student's academic deficiencies, the steps necessary to correct them, and the period of time that will be 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 of dismissal will be considered at an impending departmental committee meeting. The student has the right to attend the 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 departmental committee meeting, the committee will, without the student present, review the case and vote on the issue of dismissal. A minimum of three faculty members must be present. The student will be sent a written summary of the discussion, including the committee's recommendation and reasons for the recommendation. The student may submit a written request for reconsideration. The departmental committee may refuse to reconsider its decision. The committee's response to the request for reconsideration shall be made in writing.

RESPONSIBILITIES OF THE DEPARTMENT AND THE RESEARCH ADVISER

Departments should not admit to graduate study more students than they can reasonably provide with supervision. Departments should make every effort to help doctoral students who are admitted to candidacy to find an appropriate dissertation adviser. Students are obliged to follow department procedures for identifying a dissertation adviser and reading committee.

Occasionally, a student's research may diverge from the area of competence of the original faculty 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 help the student find another dissertation 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, the dissertation adviser is no longer available, and there is no appropriate successor, the student may prepare a final draft of the dissertation without an adviser. In this circumstance, the department has the obligation to constitute a reading committee to evaluate the draft dissertation.

GUIDELINES FOR STUDENT ACADEMIC GRIEVANCE PROCEDURES

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 pertain to individual school or department academic policies as long as those policies are consistent with general University policy.

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 thirty 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 thirty 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 will be 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 be-
come 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 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 thirty 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 thirty 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 thirty 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.

Courses in this bulletin are marked to indicate their being certified to fulfill Writing (DR:W) and Distribution Requirements (DR). Effective Autumn Quarter 1991, a new system of Distribution Requirements went into effect. Prior to the 1991-92 edition of Courses and Degrees, individual course descriptions indicated the DR area requirement that a particular course fulfilled by use of a parenthetical notation, e.g., (DR:2), at the end of the course description. In this example, the (DR:2) notation indicated the course fulfilled the Area 2 requirement under the DR system put into place in 1980. In this edition of Courses, Degrees, and Information, the above example would read DR:7(2), indicating that the course fulfills Area 7 under the newer 1991 system and Area 2 under the 1980 system. Graduate students should ignore the various DR markings since such requirements do not apply to them.

The Appendix of the current Courses, Degrees, and Information presents a comprehensive list of courses certified as fulfilling the undergraduate Distribution Requirements. The list of courses in the Appendix is arranged according to the 1991 system, with prominent notations indicating the equivalent areas under the old 1980 system of DRs. The lists of courses in the Appendix continue to use the asterisk (*) to denote those courses that, under the 1980 system, fulfill the non-Western Culture requirement. A dagger symbol (†) is used to denote those courses that fulfill the Gender Studies requirement under the new DR system.

Amendments to course offerings announced in Courses, Degrees, and Information are found in the Time Schedule, issued quarterly.

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 At Stanford, issued each January.
Emeriti: (Professors) George L. Bach, Robert T. Davis, Herbert E. Dougall, Gayton E. Germane, Thomas W. Harrell, Robert K. Jaedicke, Arthur Kroeger, Harold J. Leavitt, Gerald M. Meier, Arjay Miller, James T. S. Porterfield, Oscar N. Serbein, George P. Shultz, Ezra Solomon, Gerald O. Wentworth; (Senior Lecturer) Steven C. Brandt

Dean: A. Michael Spence

Associate Deans: James N. Baron, Paul R. Johnson, George G. C. Parker, Jerry I. Portras, Garth Saloner

Assistant Dean: Jeffrey H. Moore


Assistant Professors: Geert R. Bekaert, Daniel Diermeier, Brian J. Gibbons, Steven Grenadier, Pamela R. Haunschild, Thomas F. Hellmann, Steven J. Huddart, Daniel P. Kessler, Michael W. Morris, Fiona Scott Morton, V. Padmanabhan, Joel M. Podolny, Dimitrios Vayanos, Robin E. Wells, Samuel C. Wood, Jeffrey H. Zweibel

Professor (Teaching): George G. C. Parker


Senior Lecturers: David L. Bradford, Kirk O. Hanson

Lecturers: Robert Augsburger, Constance E. Bagley, Patricia G. Baker, Christopher J. Canellos, Lorna R. Catford, John W. Gardner, John W. Glynn, Jr., Robert E. Grady, H. Irving Groubeck, Andrew S. Grove, Mary Ann Huckabay, Peter Kremer, Jeffrey H. Moore, Joel C. Peterson, Dennis M. Rohan, Peter C. Wendell, Stephen Westly, Michele W. Zak

Visiting Professors: Henri-Claude de Bettignies, Marc J. Epstein

Visiting Associate Professor: Punam Anand

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 who seeks preparation for a professional career in management. 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 specialty in Public Management, 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.
The School of Earth Sciences includes the Departments of Geological and Environmental Sciences, Geophysics, and Petroleum Engineering. Global and other environmental studies, including policy analysis, are offered through the interschool curriculum in Earth Systems. 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, 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 menace existence, 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 degree programs are found in the section for each department.

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 office or Earth Systems advisers. The student is assigned to an academic adviser who is prepared to discuss career opportunities, courses in the earth sciences, and a program of study. Objectives in advising are (1) to help the student define a career goal, and (2) as the latter emerges, to help the student identify courses that will facilitate entry into the chosen career.

The curricula is quite broad and, aside from essential basic courses, the selection of individual courses is left to the student and the adviser. Specific requirements for the B.S. degree are listed under each department. If the student takes the basic science and mathematics courses in high school or during the first year at Stanford, more time will be available during the student's senior year for participation in advanced courses, seminars, and research projects. Each department (as well as Earth Systems) offers an honors program that involves research during the senior year.

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, in two different departments, or even in different schools (including Earth Systems), 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 departmental offices.
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 are 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.

EARTH SYSTEMS PROGRAM

Director and Chair of the Steering Committee: Jonathan Roughgarden
Steering Committee: Jeremy Bulow (Business), Marco Einaudi (Geological and Environmental Sciences), Gary Ernst (Geological and Environmental Sciences), Walter Falcon (Institute for International Studies and Food Research Institute), Lawrence Goulder (Economics and Institute for International Studies), Thomas Heller (Law and Institute for International Studies), Donald Kennedy (Biological Sciences and Institute for International Studies), Jeffrey Koseff (Civil Engineering), Donald Lowe (Geological and Environmental Sciences), Gilbert Masters (Civil Engineering), Harold Mooney (Biological Sciences), Rosamond Naylor (Institute for International Studies), Franklin Orr, Jr. (Dean, School of Earth Sciences), David Pollard (Geological and Environmental Sciences), Stephen Schneider (Biological Sciences and Institute for International Studies), David Starrett (Economics), James Sweeney (Engineering-Economic Systems), Barton Thompson (Law), Peter Vitousek (Biological Sciences), Mark Zoback (Geophysics)

Affiliated Faculty by Track:
Anthroposphere: Jeremy Bulow, Walter Falcon, Lawrence Goulder, Thomas Heller, Rosamond Naylor, Donald Kennedy, James Sweeney, Barton Thompson
Biosphere: Harold Mooney, Jonathan Roughgarden, Stephen Schneider, Peter Vitousek
Environmental Technology: Jeffrey Koseff, Gilbert Masters, Steven Monismith, Paul Roberts
Geosphere: Gary Ernst, Donald Lowe, Jonathan Stebbins, Mark Zoback

Land Systems Management: Irwin Remson, emeritus

Academic Coordinators: Justin Hayes, Julie Kennedy, Serena Schwartz

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 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 a senior project that provides an opportunity for research experience, work experience, or an internship with a government, conservation, or other appropriate agency. The electives and senior project must be approved by an Earth Systems adviser. Sample senior projects are available at the program office.
The B.S. in Earth Systems (ESys) requires the completion of at least 88 units that can be divided into three levels of courses. The student must complete a suite 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.

Note—Due to departmental reorganizations, some course numbers may change. Please check with Earth Systems office for latest information.

### REQUIRED CORE COURSES

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESys 10. Introduction to Earth Systems</td>
<td>W 3</td>
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<tr>
<td>or Civ. Engr. 170. Introduction to</td>
<td></td>
</tr>
<tr>
<td>Environmental Science and Technology</td>
<td>A 3</td>
</tr>
<tr>
<td>ESys 110. Geosphere</td>
<td>A 3</td>
</tr>
<tr>
<td>ESys 111. Biosphere</td>
<td>W 3</td>
</tr>
<tr>
<td>ESys 112. Anthrosphere</td>
<td>S 3</td>
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<tr>
<td>ESys 210. Senior Seminar</td>
<td>S 2</td>
</tr>
<tr>
<td>ESys 260. Internship</td>
<td></td>
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<tr>
<td>or ESys 250. Directed Research</td>
<td>A,W,S 9</td>
</tr>
</tbody>
</table>

### REQUIRED COGNATE COURSES

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

- **Chemistry:**
  - Chem. 31. Chemical Principles A,W 3
  - Chem. 33. Organic Chemistry W,S 4

- **Geological and Environmental Sciences:**
  - Geol. & Envir. Sci. 80. Earth Materials A 5
  - Geol. & Envir. Sci. 90. Chemistry of the Earth A 3
  - Geol. & Envir. Sci. 111. Structural and Engineering Geology A 3
  - Geol. & Envir. Sci. 150. The Oceans: An Introduction to the Marine Environment S 3
  - Geol. & Envir. Sci. 170. Environmental Geochemistry W 4
  - or Geophys. 190. General Geophysics A 4

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

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

- **Physics:**
  - Physics 51. Mechanics W 4
  - Physics 55. Light and Heat A 4

* Math. 43 is recommended for all tracks and required for majors in the environmental technology track.

* Students may take either Physics 55 or Chem. 33; Biosphere students must take Chem. 33.

### TRACKS

#### GEOSPHERE

- Geol. & Envir. Sci. 80. Earth Materials A 5
- Geol. & Envir. Sci. 90. Chemistry of the Earth A 3
- Geol. & Envir. Sci. 111. Structural and Engineering Geology A 3
- Geol. & Envir. Sci. 150. The Oceans: An Introduction to the Marine Environment S 3
- Geol. & Envir. Sci. 170. Environmental Geochemistry W 4
- or Geophys. 190. General Geophysics A 4

#### BIOSPHERE

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

* One of the following:

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

#### ANTHROSPHERE

- Econ. 52. Economic Analysis II A,W,S 5
- Econ. 118. Economics of Development A,W,S 5
- or Econ. 133. Population Perspectives in the Third World S 5
- Econ. 150. Economics and Public Policy W 5

* See Earth Systems staff for additional required core course in Anthroposphere.

#### LAND SYSTEMS MANAGEMENT

- Civ. Engr. 106. Water Resources W 4
- Geol. & Envir. Sci. 130. Environmental Earth Sciences A 4
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geol. &amp; Envir. Sci. 131. Environmental Earth Sciences II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 132. Environmental Earth Sciences III</td>
<td>5</td>
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</table>

**ENVIRONMENTAL TECHNOLOGY**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>Civ. Engr. 106. Water Resources</td>
<td>W 4</td>
<td></td>
</tr>
<tr>
<td>Civ. Engr. 160N. Mechanics of Fluids Engineering</td>
<td>A 5</td>
<td></td>
</tr>
<tr>
<td>Engr. 20. Introduction to Chemical Engineering</td>
<td>S 3</td>
<td></td>
</tr>
</tbody>
</table>

Two of the following:

* Civ. Engr. 170. Environmental Science and Technology | A 3
* Civ. Engr. 171. Environmental Planning | 4

* This course should be taken if it was not used as a core requirement.

**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**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geol. &amp; Envir. Sci. 8. Management of Geologic Hazards</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 5. The Earth’s Nonrenewable Resources</td>
<td>W 3</td>
<td></td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 112. Structural and Engineering Geology II</td>
<td>W 3</td>
<td></td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 151. Sedimentary Geology and Petrography Depositional Systems</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 170. Environmental Geochemistry</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 185. Volcanology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Geophys. 4. Natural Hazards and Man</td>
<td>W 3</td>
<td></td>
</tr>
<tr>
<td>Pet. Engr. 103. Energy Resources</td>
<td>A,S 3</td>
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**BIOSPHERE TRACK**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>Biol. Sci. 124. Plant Adaptations</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Biol. Sci. 125. Ecosystems of California</td>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>Biol. Sci. 138H. Biomechanics of Intertidal Organisms</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Biol. Sci. 283. Theoretical Population Genetics</td>
<td>3</td>
<td></td>
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<tr>
<td>Geol. &amp; Envir. Sci. 255. Introduction to Micropaleontology</td>
<td>5</td>
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**ANTHROSPHERE TRACK**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Anthro. 164. Ecological Anthropology</td>
<td>3-5</td>
<td></td>
</tr>
<tr>
<td>Econ. 106. The World Food Economy</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Econ. 125. Economic Development in Africa</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Econ. 129. Analysis of Development Projects</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Econ. 154. Economics of Legal Rules and Institutions</td>
<td>5</td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Econ. 158. Antitrust and Regulation</td>
<td>S 5</td>
<td></td>
</tr>
<tr>
<td>Econ. 165. International Economics</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Engr. Econ. Sys. 155. Economics of Natural Resources</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Food Research 145. U.S. Agriculture and the Environment</td>
<td>4-5</td>
<td></td>
</tr>
<tr>
<td>Internat. Relat. 196. Environmental Issues in International Relations</td>
<td>S 4-5</td>
<td></td>
</tr>
<tr>
<td>Pol. Sci. 140A. Ethics of Development in a Global Environment</td>
<td>1 or 4</td>
<td></td>
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**LAND SYSTEMS MANAGEMENT TRACK**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Civ. Engr. 176. Small Scale Energy Systems</td>
<td>S 3</td>
<td></td>
</tr>
<tr>
<td>Civ. Engr. 177. Building Energy Lab</td>
<td>S 2</td>
<td></td>
</tr>
<tr>
<td>Engr. 30. Engineering Thermosciences</td>
<td>W 3</td>
<td></td>
</tr>
<tr>
<td>Geophys. 170. Environmental and Geotechnical Geophysics</td>
<td>S 3</td>
<td></td>
</tr>
<tr>
<td>Pet. Engr. 103. Energy Resources</td>
<td>A,S 3</td>
<td></td>
</tr>
<tr>
<td>or Sci., Tech. &amp; Soc. 169. Development and Technology in Third World</td>
<td>A 4</td>
<td></td>
</tr>
</tbody>
</table>

* An appropriate course in Sci., Tech., & Soc. can be used to satisfy elective requirements in this track.

**SUMMARY OF COURSE REQUIREMENTS AND UNITS**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
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<tbody>
<tr>
<td>Earth Systems Introduction and Core</td>
<td>13</td>
</tr>
<tr>
<td>Required Allied Courses</td>
<td>42-45</td>
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<tr>
<td><strong>Tracks</strong></td>
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<tr>
<td>Geosphere</td>
<td>18</td>
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<tr>
<td>Biosphere</td>
<td>15-24</td>
</tr>
<tr>
<td>Anthroposphere</td>
<td>24-25</td>
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<tr>
<td>Land Systems Management</td>
<td>23</td>
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<tr>
<td>Environmental Technology</td>
<td>22-33</td>
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<tr>
<td>Upper-Division Electives</td>
<td>9-15</td>
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<tr>
<td>Senior Project or Internship</td>
<td>9</td>
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<tr>
<td>Senior Seminar</td>
<td>2</td>
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<tr>
<td>Total units (depending on track, electives)</td>
<td>90-114</td>
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**COTERMINAL BACHELOR’S AND MASTER’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 spring seminar, where the master’s student is expected to play a leadership role.

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 coterminal 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**

**Units**

**Differential Equations:**

Math. 130. Ordinary Differential Equations 3

**Linear Algebra:**

Math. 103. Matrix Theory and its Applications 3

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. 181. Behavioral Ecology 3

**Thermodynamics:**

Chem. 135. Physical Chemistry Principles 3

Geol. & Envir. Sci. 171. Geochemical Thermodynamics 3

**Geochemical Cycling:**

Geol. & Envir. Sci. 170. Environmental Geochemistry 4

or Geol. & Envir. Sci. 150. The Oceans: An Introduction to the Marine Environment 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.

The program should be developed prior to application to the master’s program and will be part of the application to the Earth Systems committee. Nine units may be in the form of research, culminating in the preparation of a master’s thesis. A thesis is not required for the degree. Master’s students must take part in the Spring Quarter senior seminar (ESys 210) and will have additional responsibilities appropriate to the master’s level (thesis presentation, modeling problems, and so on), 2 units.

**TRACKS**

**GEOSPHERE**

**Course No. and Subject**

**Units**

Required courses:

Geol. & Envir. Sci. 90. Chemistry of the Earth A 3

Geol. & Envir. Sci. 150. The Oceans: An Introduction to the Marine Environment W 3

Geol. & Envir. Sci. 151. Sedimentary Geology and Petrography: Depositional Systems W 4

Geol. & Envir. Sci. 170. Environmental Geochemistry A 4

or Geol. & Envir. Sci. 230. Hydrogeology A 5

or Civ. Engr. 261. Hydrology A 3

Other recommended courses:

Civ. Engr. 262. Surface Waters W 3

Geol. & Envir. Sci. 6. Management of Earth Resources S 3

Geol. & Envir. Sci. 231. Introduction to Groundwater Solute Transport S 3
64 SCHOOL OF EARTH SCIENCES

Geol. & Envir. Sci. 235. Roles of Fluids in Geologic Processes S 3
Geol. & Envir. Sci. 245. Computer Simulation in Geology S 3
Geol. & Envir. Sci. 251. Sedimentary Basins A 3
Geol. & Envir. Sci. 252. Sedimentary Petrography 2
Geol. & Envir. Sci. 255. Introduction to Micropaleontology W 5
Geol. & Envir. Sci. 264. Low Temperature Aquaeous Geochemistry A 3
Geophys. 150. Plate Tectonics
Geophys. 290. Tectonophysics
Pet. Engr. 103. Energy Resources A,S 3

BIOSPHERE

Recommended courses:
Biol. Sci. 118. Genetics A 3
Biol. Sci. 120. General Botany A 3
Biol. Sci. 124. Plant Adaptations 4
Biol. Sci. 125. Ecosystems of California S 4
Biol. Sci. 137. Plant Genetics 3
Biol. Sci. 138H. Biomechanics of Intertidal Organisms Sum 6
Biol. Sci. 156. Plant Physiology 4
Biol. Sci. 184. Biology of Insects 4
Biol. Sci. 189. Biology of Birds S 3

ANTHROSPHERE

Required Courses:
Econ. 202. Price Allocation Theory I A 5
or Engr. Econ. Syst. 212A. Economics Analysis A 3
Econ. 243. Economics of the Environment W 5
Engr. Econ. Syst. 255. Economics of Natural Resources S 4

Recommended Courses:
Anthro. 265. Advanced Ecological Anthropology 5
Econ. 214. Industrialization, Growth, and Economic Development A 5
Econ. 241. Public Finance and Taxation I or Econ. 242. Public Finance and Taxation II W 5
Econ. 266. International Trade Theory W 5
Engr. Econ. Syst. 215. Public Policy Design S 3
Food Res. 236. Population Perspectives in the Third World S 5
Law 224A. Environmental Law and Processes S 3
Law 224B. Environmental Strategy S 1
Pol. Sci. 225A. Introduction to Political Economy A 5

COURSES

UNDERGRADUATE

10. Introduction to Earth Systems — For non-majors and prospective Earth Systems majors. Introduces multi-disciplinary approach to how the Earth works as a system, utilizing the tools of geology, biology, and economics to understand global change on all time scales. Topics: origin of the solar system and earth, paleoclimate and climate modeling, ocean-atmosphere circulation, extinction and speciation, energy and mineral resources, economic attitudes and the environment. Case studies: acid rain, hunger and food, policy and the environment. DR:5(7) (recertification expected Autumn 1994.)
3-5 units, Win (Ernst, Roughgarden, Heller, Schneider, Gouder, Naylor, Kennedy)

110. Geosphere — (Same as Geological and Environmental Sciences 120, Geophysics 110.) 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, including 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, geochanical cycles, climate change, catastrophic impacts, and the roles played by organisms. Prerequisite: Geological and Environmental Sciences 1 or 2.
3 units, Aut (Stebbins, Zoback) MWF 9

111. Biosphere — (Same as Biology 117.) Biological causes and consequences of anthropogenic and natural changes in the atmosphere, oceans, and terrestrial and freshwater ecosystems. Topics: ocean-atmosphere-terrestrial systems; climate and climate models; the cycles of carbon, nitrogen, and other elements; chemical interaction between biota and the atmosphere; human population growth; land use; agriculture; changes in biological systems; evolution and extinctions; evolution in response to climate change. Prerequisites: one Biology or Human Biology core course.
3 units, Win (Vitousek, Mooney)

112. Anthrosphere: Human Interactions with the Earth and Environment — (Same as Civil Engineering 175, 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). Food production and global change. Economics of natural resource management and protection, emphasizing renewable resources, e.g., wildlife populations and forests. Biodiversity and the valuation of species. Connections between population growth and the environment. Prerequisite: Economics 51.

5 units, Spr (Goulder) MTWTh

125. Geologic Record of Climate Change — 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 to methods of assessing past climate change. Lectures and student presentations.

3 units, Spr (J. Kennedy)

130/230. Tectonics and Climate Seminar — (Graduate students register 230.) Analysis of global and regional climate character, climate change, and associated earth-surface processes and their relationship to large-scale tectonic movements.

1-2 units, Win (Strecker)

155/225. Federal Lands Management — (Graduate students register 255.) The Federal government is the largest single land owner in the U.S., managing over 541 million acres, and the manner in which these lands are managed has profound effects on the availability of natural resources, biodiversity, recreation, and regional economies. Seminar introduces land management agencies (BLM, NFS, NPS, etc.) and relevant legislation. Preregistration essential; forms available from Earth Systems’ office.

2 units, Spr (Hayes, D. Kennedy)

210/290. Senior Seminar in Earth Systems — (Graduate students register 290.) A forum for group discussions centered on student research and internship experiences and multidisciplinary problems in Earth Systems. Round table discussion of environmental topics and societal implications, and of recent advancements in Earth System science. Students lead two discussion sessions, one centered on the senior project and another on an interdisciplinary topic in Earth Systems selected by consultation with the Academic Coordinator.

2 units, Spr (Hayes, Schwartz)

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 is 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 senior thesis is required.

9 units, quarter by arrangement (Hayes, Schwartz)

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

1-9 units, any quarter (Staff) by arrangement

GEOLOGICAL AND ENVIRONMENTAL SCIENCES


Chair: David D. Pollard

Associate Chair: Gail A. Mahood


Associate Professors: Dennis K. Bird, Steven M. Gorelick†, Keith Loague, Michael O. McWilliams†, Elizabeth L. Miller, Jonathan F. Stebbins

Professor (Research): Michael Moldowan

Associate Professor (Research): Atilla Aydin

Courtey Professors: Simon L. Klemperer†, James O. Leckie††, Norman H. Sleep†

Senior Lecturer: George Mader


Consulting Associate Professors: Edmund Chang, Joseph W. Ruetz

* Joint appointment with Statistics.
† Joint appointment with Geophysics.
** Joint appointment with Petroleum Engineering.
†† Joint appointment with Civil Engineering.
*** Recalled to active duty.
The program leading to the Bachelor of Science degree in Geological and Environmental Sciences (G&ES) 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.

G&ES 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.

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 an adviser and the approval of the Committee on Undergraduate Affairs and Advising (CUAA). All successful graduates receive the Bachelor of Science in G&ES. Students who enroll in a predefined program likewise may have the area of specialization designated as a field on their diplomas.

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 materials that constitute the earth, including those of economic importance; the physical and chemical processes that build continents, shape the earth’s landscape, and determine the distribution of chemical elements in minerals, rocks, soils, and natural waters; the oceans and atmosphere; and the earth’s history and evolution of life. Geological sciences is also concerned with earth’s present, particularly the ways in which society is affected by natural hazards (for example, volcanic eruptions 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, materials, 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 undergraduate 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.

G&ES 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. 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>
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<tbody>
<tr>
<td>G&amp;ES 1. Planet Earth A, W, S</td>
<td>4-5</td>
</tr>
<tr>
<td>or G&amp;ES 2. 3. Earth History and Lab</td>
<td>A 5</td>
</tr>
<tr>
<td>G&amp;ES 80. Earth Materials</td>
<td>A 5</td>
</tr>
<tr>
<td>G&amp;ES 90. Chemistry of the Earth</td>
<td>A 3</td>
</tr>
<tr>
<td>G&amp;ES 102. Introduction to Field Geology Sum</td>
<td>3</td>
</tr>
<tr>
<td>G&amp;ES 110. Structural Geology S</td>
<td>5</td>
</tr>
<tr>
<td>or G&amp;ES 111. Structural and Engineering Geology I</td>
<td>A 3</td>
</tr>
<tr>
<td>G&amp;ES 151. Sedimentary Geology</td>
<td>W 4</td>
</tr>
<tr>
<td>G&amp;ES 152. Stratigraphy and Applied Paleontology</td>
<td>S 4</td>
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</table>
G&ES 160. Introduction to Statistical Methods for Earth and Environmental Science S 4
G&ES 181. Igneous and Metamorphic Processes W 5
G&ES 190A, B. Advanced Geological Research in the Field Sum 10
Subtotal .......................................................... 45-48

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 G&ES 171. Geochemical Thermodynamics A 3

Choose one of the following groups of Mathematics courses:
Math. 20. Calculus W, S 3
Math. 21. Calculus A, S 4
Math. 43. Calculus A, W, S 5
or *Math. 41. Calculus A 5
* Math. 42. Calculus A, W 5
* Math. 43. Calculus A, W, S 5

Choose one of the following groups of Physics courses:
Physics 22. Mechanics and Heat Lab A, Sum 1
Physics 23. Electricity and Optics W, Sum 3
Physics 24. Electricity and Optics Lab W, Sum 1
or †Physics 51. Mechanics W 4
† Physics 53. Electricity and Magnetism S 4
† Physics 55. Light and Heat A 4
Subtotal .......................................................... 30-34

* Math. 41, 42, 43 recommended for students planning graduate study in the sciences or engineering.
† Physics 51, 53, 55 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
G&ES 2, 3. Earth History and Lab A 5
G&ES 6. Management of Earth Resources S 3
G&ES 112. Structural & Engineering Geology II W 3
G&ES 132. Environmental Earth Sciences III S 5
G&ES 150. Oceans S 3
G&ES 170. Environmental Geochemistry W 4
G&ES 185. Volcanology S 4
G&ES 187. Hydrothermal Cycling and Concentration of Elements in the Earth's Crust A 4
Geophys. 4. Natural Hazards and Human Survival W 3
Geophys. 150. Plate Tectonics S 3
Geophys. 182. Reflection Seismology W 3
Geophys. 190. General Geophysics A 4
Physics 27. Evolution of the Cosmos A 3
Subtotal .......................................................... 12-19
Total ............................................................... 87-101

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. 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.

G&ES 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 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>Civ. Engr. 106. Water Resources</td>
<td>W 4</td>
</tr>
<tr>
<td>Civ. Engr. 170. Environmental Science and Technology</td>
<td>A 3</td>
</tr>
<tr>
<td>G&amp;ES 1. Planet Earth</td>
<td>A, W, S 4-5</td>
</tr>
<tr>
<td>G&amp;ES 80. Earth Materials</td>
<td>A 5</td>
</tr>
<tr>
<td>G&amp;ES 90. Chemistry of the Earth</td>
<td>A 3</td>
</tr>
<tr>
<td>G&amp;ES 102. Introduction to Field Geology</td>
<td>Sum 3</td>
</tr>
<tr>
<td>G&amp;ES 110. Structural Geology</td>
<td>S 5</td>
</tr>
<tr>
<td>or G&amp;ES 111. Structural &amp; Engineering Geology I</td>
<td>A 3</td>
</tr>
</tbody>
</table>
### COURSE LIST

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>G&amp;ES 130. Environmental Earth Sciences I</td>
<td>A 4</td>
</tr>
<tr>
<td>G&amp;ES 131. Environmental Earth Sciences II</td>
<td>W 4</td>
</tr>
<tr>
<td>G&amp;ES 151. Sedimentary Geology</td>
<td>W 4</td>
</tr>
<tr>
<td>G&amp;ES 160. Introduction to Statistical Methods for Earth and Environmental Sciences</td>
<td>S 4</td>
</tr>
<tr>
<td>G&amp;ES 170. Environmental Geochemistry</td>
<td>W 4</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>48-51</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 G&amp;ES 171. Geochemical Thermodynamics</td>
<td>A 3</td>
</tr>
<tr>
<td><strong>Choose one of the following groups of Mathematics courses:</strong></td>
<td></td>
</tr>
<tr>
<td>Math. 20. Calculus</td>
<td>W,S 3</td>
</tr>
<tr>
<td>Math. 21. Calculus</td>
<td>A,S 4</td>
</tr>
<tr>
<td>Math. 43. Calculus</td>
<td>A,W,S 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>A,W,S 5</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>33-38</strong></td>
</tr>
</tbody>
</table>

* Math. 41, 42, 43 recommended for students planning graduate study in the sciences or engineering.

† Physics 51, 53, 55 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:

**Biology**

- **Biol. Sci. 117. Biology and Global Change**  
  W 3

- **Civ. Engr. 266. Environmental Policy**  
  Design and Implementation  
  S 4

- **Comp. Sci. 106A. Programming Methodology**  
  A,W,S 5

- **Engr. 60. Engineering Economy**  
  A,W 3

- **G&ES 2.3. Earth History and Lab**  
  A 5

- **G&ES 6. Management of Earth Resources**  
  S 3

- **G&ES 112. Structural and Engineering Geology II**  
  W 3

- **G&ES 115. Engineering Geology Practice**  
  S 3

- **G&ES 132. Environmental Earth Sciences III**  
  S 5

- **G&ES 150. Oceans**  
  S 3

- **G&ES 171. Geochemical Thermodynamics**  
  A 3

- **G&ES 185. Volcanology**  
  S 4

- **Geophys. 170. Environmental and Geotechnical Geophysics**  
  S 3

- **Hum. Biol. 148. Environmental Policy**  
  S 3

  S 3

- **Pet. Engr. 103. Energy Resources**  
  A,S 3

**Subtotal**  
**93-108**

### 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.

G&ES 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.

**Core Courses:**

- **G&ES 1. Planet Earth**  
  A,W,S 4-5

- **Geophys. 4. Natural Hazards**  
  A 3

- **G&ES 80. Earth Materials**  
  A 5

- **G&ES 102. Introduction to Field Geology**  
  Sum 3

- **G&ES 111. Structural and Engineering Geology I**  
  A 3

- **G&ES 112. Structural and Engineering Geology II**  
  W 3

- **G&ES 115. Engineering Geology Practice**  
  S 3

- **G&ES 160. Introduction to Statistical Methods for Earth and Environmental Sciences**  
  S 4

- **G&ES 230. Hydrogeology**  
  A 5

- **Geophys. 170. Environmental and Geotechnical Geophysics**  
  S 3

**Earth Science Subtotal**  
**37-38**

- **Civ. Engr. 106. Water Resources**  
  W 4

- **Civ. Engr. 160N. Mechanics of Fluids**  
  A 5
GEOLOGICAL AND ENVIRONMENTAL SCIENCES 69

Civ. Engr. 190. Geotechnical Engineering A 4
Comp. Sci. 106A. Programming Methodology A,W,S 5
Engineering Subtotal ............................................ 23

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 A,W,S 5
Physics 51. Mechanics W 4
Subtotal .............................................................. 23

SUGGESTED ELECTIVES
Civ. Engr. 180A. Introduction to Structural Analysis A 3
Civ. Engr. 180B. Structural Analysis W 4
Civ. Engr. 270. Movement, Fate, and Effects of Contaminants in Surface Waters and Groundwater A 3
Civ. Engr. 291. Foundation Engineering S 3
Civ. Engr. 293. Experimental Soil Mechanics W 2
Engr. 30. Engineering Thermodynamics A,W,S 3
Engr. 50. Introductory Science of Materials S 3
G&ES 130. Environmental Earth Sciences I A 4
G&ES 131. Environmental Earth Sciences II W 4
G&ES 132. Environmental Earth Sciences III S 5
G&ES 215. Advanced Structural Geology and Rock Mechanics S 3-4
G&ES 216. Rock Fracture Mechanics S 3-4
G&ES 217. Characterization and Hydraulics of Rock Fracture W 3
G&ES 231. Introduction to Groundwater Solute Transport S 4
G&ES 235. Role of Fluids in Geologic Processes S 3
Geophys. 190. General Geophysics A 4
Mech. Engr. 100. Differential Equations in Engineering W 3
Mech. Engr. 111. Stress, Strain, and Strength A 3
Subtotal .............................................................. 11-17
Total ................................................................. 94-101

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 very 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 G&ES programs.

G&ES 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

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civ. Engr. 170. Environmental Science and Technology</td>
<td>A 3</td>
</tr>
<tr>
<td>Civ. Engr. 171. Environmental Planning</td>
<td>W 3</td>
</tr>
<tr>
<td>Comp. Sci. 105A. Introduction to Computers</td>
<td>A,S 5</td>
</tr>
<tr>
<td>or Comp. Sci. 106A. Programming Methodology</td>
<td>A,W,S 5</td>
</tr>
<tr>
<td>Econ. 1. Elementary Economics</td>
<td>A,W,S 5</td>
</tr>
<tr>
<td>G&amp;ES 1. Planet Earth</td>
<td>A,W,S 4-5</td>
</tr>
<tr>
<td>G&amp;ES 2. 3. Earth History and Lab</td>
<td>A 5</td>
</tr>
<tr>
<td>G&amp;ES 5. The Earth’s Nonrenewable Resources</td>
<td>W 3</td>
</tr>
<tr>
<td>G&amp;ES 6. Management of Earth Resources</td>
<td>S 3</td>
</tr>
<tr>
<td>G&amp;ES 80. Earth Materials</td>
<td>A 5</td>
</tr>
<tr>
<td>G&amp;ES 102. Introduction to Field Geology</td>
<td>Sum 3</td>
</tr>
<tr>
<td>G&amp;ES 130. Environmental Earth Sciences I</td>
<td>A 4</td>
</tr>
<tr>
<td>G&amp;ES 131. Environmental Earth Sciences II</td>
<td>W 4</td>
</tr>
<tr>
<td>G&amp;ES 132. Environmental Earth Sciences III</td>
<td>S 5</td>
</tr>
<tr>
<td>G&amp;ES 150. Oceans</td>
<td>S 3</td>
</tr>
<tr>
<td>G&amp;ES 160. Introduction to Statistical Methods for Earth and Environmental Sciences</td>
<td>S 4</td>
</tr>
<tr>
<td>Urban Studies 170. Introduction to Urban Design</td>
<td>W 5</td>
</tr>
</tbody>
</table>

Subtotal .............................................................. 65-66

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 .............................................................. 9-10

ELECTIVES
Choose one course from each of the following groups:

Group A
Engr. 60. Engineering Economy A,W 3
Geophys. 4. Natural Hazards and Human Survival W 3
Pet. Engr. 103. Energy Resources A,S 3

Group B
Food Research Inst. 103. The World Food Economy W 4
Food Research Inst. 121. Development and Population Interactions in the Third World W 5

Group C
Art 3. Introduction to the History of Architecture S 5
Art 175A. Modern Architecture I W 4
Art 175B. Modern Architecture II S 4
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 letter grade indicator (LGI) 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.

Applying to the honors program involves a formal review of the student’s academic record and submitting a research proposal to the department’s Undergraduate Activities Committee. Normally, 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 G&ES 199; 3 units/quarter are assigned to the project for three quarters of the student’s senior year for a total of 9 units. Note that research undertaken for the honors program cannot be used as a substitute for regularly required courses. Both a written and 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 full fledged 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 between their seventh quarter (or after earning 105 units) and no later than their eleventh quarter. They are required to submit an application for entrance to the G&ES coterminal 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 G&ES 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 G&ES office.
GRADUATE PROGRAMS

Graduate studies in the Department of Geological and Environmental Sciences (G&ES) 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 nine broad areas of faculty teaching and research are divided into fields, which have diploma designation, and area specializations.

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 Admissions and Awards Committee. A coterminal B.S./M.S. program is open to Stanford undergraduates.

FIELDS

Geomathematics — The Geomathematics program, under the direction of Professor Harbaugh, leads either to an M.S. or Ph.D. degree in G&ES. It focuses on the use of mathematics in simulating geologic processes in petroleum-bearing sedimentary basins. Stress is placed on representing the physics of geologic processes, including the flow of currents in rivers and the sea, the transport and deposition of sediment by currents and waves, and the motions of pore water and hydrocarbons as compaction and structural deformation take place. These 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, and the individual geologic processes are then linked to form integrated three-dimensional dynamic systems used for experiments in which actual sedimentary basins are simulated.

The program lies at the interface between computer graphics, computer programming, geology, mathematics, and physics. Students in the program should have demonstrated aptitude for mathematics and computer programming and should be at home in courses in computer science, fluid mechanics, geology, geophysics, mathematics, and petroleum-reservoir engineering. Some courses in the program are selected for their relevance to the student's specific thesis or dissertation research. A list of required and recommended courses will be supplied upon request.

Geostatistics in the Earth Sciences — The Geostatistics program, which leads to an M.S. or Ph.D. degree in G&ES, 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. These numerical 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 industry (mining, oil) and the environmental scene (EPA).

Hydrogeology — The Hydrogeology program, which leads to an M.S., Engineer, or Ph.D. degree in G&ES, balances research in both purely scientific and the applied aspects of groundwa-
ties in this specialization leading to the M.S. or Ph.D. degree are available in 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. Other faculty members with related research interests who participate in the program are Professors Gorelick and Loague (hydrogeology); Professors Mavko and Nur (rock physics), Segall (crustal deformation and fault mechanics), and Zoback (tectonophysics) from the Department of Geophysics; and Professors Aziz, Hewitt, Journel, and Orr (reservoir characterization, simulation, and geostatistics) from the Department of 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, fractures, folds, 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 often followed by students in this program include field mapping of ancient or active 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.

Graduate students may specialize in this program by arranging a curriculum of courses and research, tailored to their specific needs, that is approved by the program advisers. Correspondence with the advisers before application is suggested to clarify the nature and requirements of the program.

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 paleoecologic signatures of annually varved sediments 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, paleogeology, paleomagnetism, sedimentology, and seismic interpretation, with emphasis on interdisciplinary integration. Current projects include research on the origins and evolution of sedimentary basins in China, sediment-gravity flow mechanisms and the structure of associated deposits, paleo-climatology and sedimentation of modern western Pacific marginal seas, 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 Graham, Ingle, and Lowe; faculty with related or overlapping interests include Gorelick, Harbaugh, McWilliams, and Miller.

Structural Geology, Regional Geology, and Tectonics — The specialization in Structural Geology, Regional Geology, and Tectonics is composed of eleven faculty in two departments and 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. \( \text{Ar}^{40}/\text{Ar}^{39} \), 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 calibration of 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 Aydin, Ernst, McWilliams, Miller, Page (emeritus), Pollard, Sleep, and Thompson (emeritus) in Geological and Environmental Sciences, and Klemperer, Nur, Segall, and Zoback in Geophysics. Research interests overlap with many other research programs in the school.

Surface and Aqueous Geochemistry — Environmental and low-temperature aqueous geochemistry at Stanford is represented primarily by Professors Brown and Parks in Geological and Environmental Sciences and Leckie in Civil Engineering. Members of the Surface and Aqueous Geochemistry Group (SAAG) are interested 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.

Students who choose this area design individual programs or curricula with the help of one or more advisers and the approval of the G&ES Graduate Committee. 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 Mahood and Pollard have overlapping interests with Professors Aydin and Segall 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 gasses 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 Committee 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 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 Committee.

Requirements —The University's requirements for M.S. degrees are outlined in the "Advanced Degrees" section of this bulletin. 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 or master's report 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 Committee of the department; 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 Departmental Graduate Committee.

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 "Advanced Degrees" section of this bulletin. A summary of additional departmental requirements is presented below.

There are three basic requirements for the Ph.D. degree:

1. Ph.D. students must pass the required courses in their individual program or in their specialized area of study with a letter grade indicator 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.

2. Each student must qualify for candidacy for the Ph.D. by the end of the sixth quarter in residence, excluding summers. Departmental procedures require selection of a faculty research adviser, preparation of a written research proposal, approval of this proposal by the research adviser, selection of a committee for the research examination, and approval of the membership by the Graduate Committee 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.

3. Upon qualifying for Ph.D. candidacy, the student and adviser, who must be a department faculty member, choose a Research Advisory Committee that will include 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.

Doctoral Dissertation —Under the supervision of the Research Advisory Committee, the candi-
date 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.

In accordance with University procedure, the department shall appoint the research adviser and two other members of the Research Advisory Committee to be readers of the 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. Until such written and signed certification has been received by the department, the student is not permitted to schedule the University oral examination.

COURSES

UNDERGRADUATE

Courses in the Summer Quarter are offered for a 10-week period unless otherwise noted. Students are urged to examine the courses offered by other departments, particularly those in Chemistry, Engineering, Geophysics, Petroleum Engineering, Physics, Materials Science, Mathematics, and Statistics.

1. Planet Earth — For non-majors and prospective geological and environmental sciences majors. Introduction to and survey of the physical and chemical 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. Non-renewable resources, energy, and environmental problems. Lectures, homework assignments, one all-day field trip, and one weekly three-hour lab required. Recommended: high school chemistry and physics. DR:5(7)

3 units, Aut (Lowe) MWF 11

2. Earth History — For non-majors and prospective 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 evolutionary parade of organisms, from self-replicating molecules to man, that have interacted with and often 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. Enroll concurrently in G&ES 3 to examine the materials and organisms discussed, majors in geology must take G&ES 3 either concurrently or in a subsequent year. DR:5(7)

3 units, Aut (Lowe) by arrangement

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

2 units, Aut (Lowe) by arrangement

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 to many aspects of our society.

1 unit, Aut, Win, Spr (Staff) Th 12:15

5. The Earth’s Nonrenewable Resources — The occurrence, economics, history, and politics of the earth’s nonrenewable resources including oil and gas, coal, groundwater, radioactive fuels, metals, and non-metallic minerals. Topics: resources and reserves, environmental impacts of mining and oil production, nuclear waste disposal, water resources, strategic minerals, and the world resource situation. DR:6(8)

3 units, Win (Staff) TTh 2:15-4:05

6. Management of Earth Resources — Introduces the principles of supply and demand analysis, price formation mechanisms, and project evaluation to graduate and undergraduate students. Current mineral economic techniques and their limitations, and novel methods of investment analysis and price projection. Topics: distinctions between demand and consumption; methods of demand analysis based on macroeconomic parameters, sectoral analysis, and commodity correlation; mineral and metal production technologies; production economics and supply projections; price formation mechanisms; project valuation methods; resource financing; industry structure; and legislation.

3 units, Spr (Thiers) TTh 1:15
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: animal tracking, environmental ethics, first aid, geological processes, global dynamics, land management, and plant ecology. Four weekend outings focus on minimum impact backcountry skills including backcountry ski technique, backpacking, 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.

7A. 1 unit, Aut (Bird, Staff)
7B. 1 unit, Win (Bird, Staff)
7C. 1 unit, Spr (Bird, Staff)

9. Field Trip to Death Valley—Priority given to prospective and new majors in the G&ES, Geophysics, and Earth Systems and to students who have taken G&ES 1, 2, or 4. Introductory lectures, followed by a five-day field trip to study the geology and desert environment of Death Valley during Spring break. Observations of recent motion on faults and volcanic eruptions, the way mountains are built and eroded away, and a billion years of earth history displayed in the walls of rugged 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) by arrangement

50. The Coastal Zone Environment—Open to Sophomores only. This seminar will examine the oceanographic, geological, and biological character of coastal zone environments including continental shelves, estuaries and coastal wetlands with a special focus on San Francisco Bay, one of the largest urbanized estuaries in the world. Lectures, assigned reading, group discussions, and field trips will be used to develop these topics. Field trips will examine various estuarine and coastal environments of the San Francisco Bay region and include visits to governmental agencies and facilities responsible for monitoring the coastal zone. Students will carry out original research on some aspect of the San Francisco Bay system during the second half of the quarter resulting in an end-quarter written and oral report. Enrollment limited to 10 sophomores. Prerequisites: any beginning course in the earth sciences, chemistry, or the biological sciences (e.g. Biol. 1, Chem. 30, 31, Geol. Env. Sci. 1, 2 or 150, or Earth Sys. 10).

3 units, Aut (Ingels) weekday and weekend field trips by arrangement

51. Volcanoes of the Eastern Sierra Nevada—Open to Sophomores only. Observe first-hand striking geology in a 4-day camping field trip over the Memorial Day weekend. 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.

2 units, Spr (Mahood)

80. Earth Materials—Identification, classification, and interpretation of rock-forming minerals and the igneous, sedimentary, and metamorphic rocks they comprise. Rock cycles are related to earth systems. Lab work emphasizes use of the hand lens in making observations; field trips demonstrate rock structures and genetic associations. Prerequisite: 1. Recommended: introductory chemistry.

5 units, Aut (Brown, Liou) MWF 9, lab MW or TTh 1:15-4 field trips by arrangement

90. Introduction to Geochemistry—Introduction to the chemistry of the solid earth and its atmosphere and oceans, emphasizing the processes that control the distribution of the elements in the earth over geological time and at present, and on the conceptual and analytical tools needed to explore these questions. Basics of geochemical thermodynamics and isotope geochemistry. The formation of the elements, crust, atmosphere and oceans, global geochemical cycles, and the interaction of geochemistry, biological evolution, and climate.

3 units, Win (Stebbins) MWF 11

102. Introduction to Field Geology—Instruction and practice in the basic methods of geologic investigation in the field. Emphasis 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. See Summer at Stanford 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) by arrangement

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.

5 units, Spr (Miller) MWF 9, lab Th 1:15-4:05 part-day and weekend field trips by arrangement

111. Structural and Engineering Geology I —
First of a two-course sequence on the observational techniques and theoretical foundations of structural and engineering geology. Interactive computer exercises are integrated with field data acquisition and textbook descriptions to understand the role of geologic structures in the evolution of earth's crust, natural resource recovery, and geologic hazards. Topics: structural quantities, modern techniques for mapping and measurement of deformation using total station survey equipment and the satellite-based Global Positioning System (GPS), use of descriptive geometry and Geographic Information Systems (GIS) for analyzing field data, computer models for the evolution of geologic structures. Prerequisites: 1, calculus, Macintosh skills. Recommended: 80, 102.

3 units, Aut (Pollard) MWF 10 computer labs and two field trips by arrangement alternate years, not given 1995-96

112. Structural and Engineering Geology II —
Second of a two-course sequence. Topics: physical properties of rock, and an introduction to continuum mechanical models of structures; description and growth of fractures in rock; geometry of folds and the mechanism and conditions of folding rock layers; the description of faults and the mechanics of faulting. Applications: fluid flow in fractured rock; interpretation of subsurface structures; earthquake, landslide, and volcanic hazards. Prerequisite: 111.

3 units (Pollard) not given 1994-95

115. Engineering Geology Practice —
The application of geologic fundamentals to 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 foundation, transportation facilities, excavations, tunnels and underground storage space, water supply facilities, and marine works. Prerequisite: 110 or 111, or consent of instructor.

3 units, Spr (Holzer) MW 9

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, including 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 (Stebbins, Zoback) MWF 9

130. Environmental Earth Sciences I —
First of a three-course sequence on the relationship of environmental earth sciences to land use planning. Major 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 project area and present results to class. DR:6(8)

4 units, Aut (Mader, Remson) MWF 11 labs, seminars, and field trips by arrangement

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 general land capability maps for the project area. Field trip to observe examples of land use projects adapted to environmental constraints.

4 units, Win (Mader, Remson) MWF 11 lab, seminars, and field trips by arrangement

132. Environmental Earth Sciences III —
Topics: procedure for preparation of general plans, new town concepts, climatic water balance, hydrologic management, pollution and wastes, and sanitary landfill. Groups prepare and present a general plan diagram and text along with a proposed implementation program for the project area. Field trip to
examples of good design on the San Francisco Peninsula.

5 units, Spr (Mader, Remson) MWF 11
   labs, seminars, and field trips by arrangement

133. Introduction to Assessment of Environmental Risk — Interdisciplinary approach, combining quantitative methods used in the social sciences with the earth sciences; evaluates environmental and natural hazard risks in a spatial context. The earth sciences, applied statistics, and microeconomics are integrated in a decision framework to develop site-specific case studies such as locating a waste-disposal facility and regional policy planning applications such as defining rules for reducing earthquake related damage. Examples of risk-benefit, benefit-cost, and cost-effectiveness analyses used to address environmental issues. Techniques developed are applied in a group exercise to evaluate a current land-use issue.

3 units, Win (Bernknopf) TTh 11

150. 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. DR:5(7)

3 units, Spr (Ingle) MWF 11
   demonstrations, field trip by arrangement

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.

4 units, Spr (Ingle) MWF 9
   lab T 1:15-4, field trips by arrangement


4 units, Spr (Ingles) TTh 11
   lab T 1:15-4:05, three required field trips, research conferences by arrangement

160. Introduction to Statistical Methods for Earth and Environmental Sciences — Data summaries, graphical display of information, measures of association, time trends, sampling, quantification of uncertainty, statistical models, statistical testing and prediction, statistical computing. Examples chosen primarily from environmental monitoring case studies.

4 units, Spr (Switzer) TTh 11-12:15
   plus section

165. Geochronology — (Same as Geophysics 165.) Introduction to the principles of geochronology and thermochronology and the application of modern tools 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, magnetostratigraphy, and cosmogenic exposure ages. Alpha counting, mass spectrometry by gas-source, solid source and ion probe methods. Fundamentals of K-Ar, Ar-Ar, Rb-Sr, and U-Pb and fission track methods. Recommended: undergraduate training in calculus, chemistry, geology, and physics.

3 units, Spr (McWilliams) MWF 11

170. Environmental Geochemistry — Introductory study of the solid, aqueous, and gaseous phases comprising the environment, their natural compositional variations, and their chemical interactions, emphasizing 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 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, radioactivity 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, Staff) MW 10

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) TTh 10-11:30

181. Igneous and Metamorphic Processes — Origin of igneous and metamorphic rocks, emphasizing magmatic differentiation and subsolidus recrystallization processes and their imposed physicochemical 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 exercises involve 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.

5 units, Spr (Liou) MWF 11
lab MW 1:15-4:05

185. Volcanology — For upper-division 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.

4 units (Mahood) not given 1994-95

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) not given 1994-95

187. Hydrothermal Cycling and Concentration of Elements in the Earth's Crust — 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 strata-bound 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) not given 1994-95

190A, B. Advanced Geologic Research in the Field — An opportunity for juniors and seniors to carry out a substantial field investigation of professional scope, providing in-depth exposure to the analysis of relatively complex geologic problems. Assumes familiarity with elementary techniques of data collection and analysis in the field. 190A (field) involves coordinated field mapping, stratigraphic and rock lithologic descriptions, structural data collection, application of various survey methods and plotting/compilation of geologic and geomorphic data on topographic maps and aerial photographs. Short reports on this work are written in the field. Credit for 190A requires completion of 190B. 190B (conducted in the field or on campus) involves final compilation and synthesis of field relations, stratigraphic columns, geologic maps and cross-sections, structural data and selected lab investigations as part of a formal written report of professional scope. Prerequisites: 1, 2, 102, 110 or 111, 151; or consent of instructor. Recommended: 80.

190A. 6 units, Sum (Miller, Staff) alternate years and/or by arrangement
190B. 4 units, Sum (Miller, Staff) alternate years and/or by arrangement

198. Special Problems in Geological and Environmental Sciences — Supervised reading, field and/or lab research with written reports. 1-10 units, any quarter (Staff) by arrangement

199. Honors Program — Research on a topic of special interest. See "Undergraduate Honors Program" above.

3 units, Aut, Win, Spr, Sum (Staff) by arrangement
GRADUATE

210. Geologic Evolution of the Western U.S. Cordillera — Broad-based overview of the geology of the western states appropriate for undergraduate and graduate students with a range of interests and background. 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 this and other mountain chains.

2 or 3 units (Miller) alternate years, given 1995-96

211. Topics in Regional Geology and Tectonics — Seminar.

2 units, Win (Miller)

215. Advanced Structural Geology and Rock Mechanics — (Same as Geophysics 215.) Concepts and theories of rock deformation with application to structural geology, engineering geology, rock mechanics, and tectonophysics. Methods for analyzing stress, strain, and displacement fields in the earth. Governing equations of elastic plate theory are derived and applied to crustal flexure and multilayer bending. The governing equations of two-dimensional elastic theory are derived and applied to tectonic loading and mechanisms of stress concentration. Introduction to the fundamentals of fracture mechanics. Prerequisites: elementary calculus, mechanics, and structural geology.

3-4 units Spr (Pollard) MWF 10 alternate years, not given 1995-96


3-4 units (Pollard) alternate years, given 1995-96

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, Win (Aydin) MWF 11 alternate years, not given 1995-96

230. Hydrogeology — Theory of underground water, analysis of field data and pumping tests, geologic groundwater environments, solution of field problems, groundwater modeling. Prerequisite: elementary calculus.

5 units, Aut (Gorelick, Loague) TTh 10-11:30 seminar T 2:15-4:05, lab by arrangement


4 units, Win (Gorelick) TTh 10-11:30

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 1994-95

235. Role of Fluids in Geologic Processes — Principles governing geologic processes in which fluids (groundwater) play an important role. Regional flow of groundwater, movement and entrapment of petroleum, development of anomalous fluid pressures, role of fluid in tectonic movements, hydraulic fracturing as a measure of in-situ stress, transport of chemical constituents by groundwater, flow in fractured rock, and transport of heat by groundwater. Prerequisites: elementary calculus, 230.

3 units (Hsieh) given 1996-97

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 storage, wellbore skin, aquifer boundaries, and hetero-
differential equations to represent the processes. Models in geology, stressing numerical solutions of developing dynamic geologic process simulation. Students may also participate in 345.) Procedures for upscaling hydrodynamic properties. May be repeated for credit. Prerequisites: 240, advanced calculus, Fortran/Unix.

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.

4-5 units, Win (Loague) MWF 10-11
lab W 1-4

241. Practice of Geostatistics on Exhaustive Data Bases — (Same as Petroleum Engineering 241.) Based on a numerical model of a deposit/reservoir. Student teams receive a budget for drillholes and the same geological information. The deposit is studied through maps, variograms, kriging. Economic feasibility is performed from the estimates of recoverable reserves. All results are checked against underlying reality. Prerequisites: 240, Fortran/Unix.

4-5 units Spr (Journel) TTh 10-12

242A,C. Topics in Advanced Geostatistics — (Same as Petroleum Engineering 242.) Topics chosen from 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.

4 units (Journel) not given 1994-95

244. Multivariate Statistical Methods for Earth Sciences — For graduate students. See 144.

245. Computer Simulation in Geology — (Students may also 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 threedimensional flow models. Stochastic procedures introduced. Emphasis on graphic display, with use of three-dimensional graphics computers. Prerequisite: elementary computer programming.

3 units (Harbaugh) not given 1994-95

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 (Harbaugh, Kourt) not given 1994-95

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) not given 1994-95

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 (Lowe) not given 1994-95

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) TTh 1:15-3:05

252. Sedimentary Petrography — Examination and interpretation of siliciclastic sediments and sedimentary rocks. Lectures/readings 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. Corequisite: 252L.

2 units (Lowe)
alternate years, given 1995-96

2 units, Spr (Demaison) M 4:15-6:05

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 (Ingle) alternate years, given 1995-96

257. Introduction to Organic Geochemistry — Organic geochemistry, the study of the fate of organic materials in the geologic record, finds application in environmental science, historical geology and archeology, paleo-environmental reconstruction, and petroleum exploration and exploitation. Current methods in organic geochemistry including bulk methods for source rock evaluation, isotopic interpretation applied to oil and gas analysis, microscopic methods, and petroleum composition. Emphasis is on biomarkers (molecular fossils) and their interpretations.

3 units, Win (Moldowan) T 3:30-6

259. Seminar: Sedimentary Geology — Discussion of current topics in sedimentary geology.

2 units, Win (Graham) by arrangement

261. 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 (Brown) alternate years, not given 1995-96

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 (Leckie) M 2:15, TTh 11

265. Surfaces and Interfaces — Directed reading on the properties of surfaces and interfaces. Chemical reactions peculiar to surfaces, especially adsorption at mineral/water interfaces. Influence of surface chemistry and adsorption on geochemical processes. Prerequisites: 80 and 264, Chemistry 171 or Materials Science and Engineering 181, or consent of instructor.

2-4 units, Aut, Win, Spr (Parks)

by arrangement


3 units, Win (Bird) WF 10-12

alternate years, not given 1995-96

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 1995-96

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, rather than being a comprehensive survey of the diversity of hard rocks. Introduction to chemical kinetics and order-disorder phenomena in geologic systems.

4 units, Win (Ernst) by arrangement

271. Advanced Metamorphic Petrogenesis — For those who have had an introduction to metamorphic petrology and phase equilibria. Topics: the origin and evolution of metamorphic rocks emphasizing metamorphic processes and petrogenesis in the mid-to-lower continental crust; the evolution and maturation of continental crust from geochemical and geophysical points of view through the integration of information from heterogeneous phase equilibria, crystal chemistry, trace element and isotopic geochemistry, experimental geochemistry, and tectonics; the generation of crustal material and its modification by various processes in a tectono-thermal framework that allows a quantitative assessment of the evolution of metamorphic belts. Two lectures, one lab weekly.

3 units, Win (Bohlen)

alternate years, not given 1995-96

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. Teaches the basic principles needed to quantitatively analyze chemically complex geological materials. Limited enrollment.

2 units, Win (Jones) by arrangement


2 units, Win or by arrangement (Jones)


2-3 units, Spr (Sparks) MW 2:15-3:30

lab by arrangement

277. Rock Sample Preparation — For graduate students and advanced undergraduates requiring practical instruction on the safe use of rock-crushing and mineral-separation equipment for their research.

1 unit, Win (Mahood, Sparks)

alternate years, not given 1995-96

278. Radiogenic Isotopes — Topics: mass spectrometric techniques; fundamentals and geochronology of the Rb-Sr, Sm-Nd, Re-Os, U-Pb, and U-series disequilibrium systems; formation of meteorites and early history of the earth; continental growth curves; evidence for nature of basalt sources and implications for mantle convection; evolution of mafic magmas in the lower crust; evidence for contributions from subducting slabs to arc magmas; residence times of magmas and magma chamber processes; multiple origins of rhyolitic magmas; granites as imperfect mirrors of their source regions; trace-element modeling of partial melting, fractional crystallization, magma mixing, and combined assimilation-fractional crystallization; pitfalls of the use of trace-element discriminant diagrams in
300. 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, 264, and 265; consent of instructor.

2-4 units, one quarter annually (Brown, Parks)

370. Seminar in Mineralogy
1-3 units, Aut, Win, Spr (Staff)
by arrangement

371. Seminar in Geochemistry
1-3 units, Aut, Win, Spr (Staff)
by arrangement

372. Seminar in Igneous Petrology-Volcanology
1-3 units, Aut, Win, Spr (Mahood)
by arrangement

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, Aut, Win, Spr (Liou, Coleman, Ernst)
by arrangement

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 planned and guidebook prepared in winter. Field trip (1-2 weeks) Winter Quarter. Students prepare papers and make oral presentations. Pre- or corequisite: 268.

2 units, Win (Einaudi)

Problems in Various Fields of Geological and Environmental Sciences
(Staff) units, quarter, time by arrangement

313. Problems in Quantitative Structural Geology, Neotectonics, and Geomechanics
319. Problems in Structural Geology
339. Problems in Hydrogeology
349. Problems in Geomathematics
355. Problems in Oceanography
358. Problems in Paleontology, Palynology, and Paleoecology
359. Problems in Sedimentary Geology
369. Problems in Geochemistry
378. Problems in Mineralogy
379. Problems in Petrology and Volcanology
399. Problems in General Geology

Research in Various Fields of Geological and Environmental Sciences
(Staff) units, quarter, time by arrangement

413. Research in Quantitative Structural Geology, Active Tectonics, and Geomechanics
419. Research in Structural Geology
439. Research in Hydrogeology
448. Research in Geomathematics in Process Simulation and Petroleum Resource Analysis
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
459. Research in Paleontology, Palynology, and Paleocology
463. Research in Organic Geochemistry
466. Research in Low Temperature Aqueous Geochemistry
469. Research in Geochemistry
477. Research in Ore Deposits and Exploration
478. Research in Petrology and Volcanology
479. Research in Mineralogy
499. Research in General Geology

George A. Thompson (on active duty)
Mark D. Zoback
Jon F. Claerbout, Robert L. Kovach, Amos M. Nur, Jonathan Roughgarden*, Norman H. Sleep, Mark D. Zoback
Gregory C. Beroza, Steven Gorelick†, Jerry M. Harris, Simon L. Klemperer, Michael O. McWilliam†, Paul Segall
Antony Fraser-Smith**
Gerald M. Mavko
Ginger A. Earth, Colleen Barton, Jack Dvorkin, Pavel Peska, Lev Vernik
Stephan A. Graham, David D. Pollard
Phillip Farrell
Biondo Biondi, William Ellsworth, Cecil Green, Rosemary Knight, Walter Mooney, Francis Muir, William Ostrander, Uri tenBrink, George Zandt
Manfred Strecker
Ruth A. Harris

Geophysics is the branch of earth science concerned with exploring and analyzing active processes of the earth by 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 the 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, several large scale microcomputers, a high pressure and temperature rock deformation laboratory, various instruments for field measurements including 200 seismic group recorders, four dual frequency GPS receivers, and field equipment for measuring in situ stress at great depth. Current research activities include earthquake mechanics, geophysical well logging, application of seismology to the study of present-day tectonics, near field seismology, seismic studies of the continental lithosphere, isotopic age dating, paleomagnetic investigations of regional tectonics, behavior of the geomagnetic field, free oscillation and surface wave studies, and major programs in reflection seismology and experimental and theoretical rock physics. Graduate programs lead to the degrees of Master of Science and Doctor of Philosophy.

Objectives — To provide a solid background in the essentials of 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, U, 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 120. Electricity and Magnetism
Geol & Envir. Sci. 1. Planet Earth
Geol & Envir. Sci. 80. Earth Materials
Geol & Envir. Sci. 102. Introduction to Field Geology
Math. 19, 20, 21, and 44, or 41, 42, 43, and 44.
Analytical Geometry and Calculus
Math. 130. Ordinary Differential Equations
Physics 51, 53, 54, 55, and 56. Elementary Physics
Physics 110, 111. Mechanics

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.

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. Before the end of the year, each honors candidate shall give a seminar on his or her work. This seminar is announced publicly and is open to the general audience.
5. 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.
6. 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 enhance the student's training for professional work in geophysics through the completion of fundamental courses, both in the major fields and in related sciences, and to begin independent work and specialization.

Requirements for the Degree — The candidate must:

1. Be registered as a graduate student for at least three quarters at full tuition.
2. Complete 45 units with a letter grade indicator (LGI) of at least 'B.' Engineering 102W is required. At least 6 of these units must be independent work on a research problem, resulting in a written report accepted by the candidate's faculty adviser. Normally, this research is undertaken as part of the candidate's participation in three quarters of Research Seminar (Geophysics 385A,D,E,F,G,H,J,K,L,M,S,T,U,V).
3. 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. A background in field geology should be at the level of Geological and Environmental Sciences 190A and B.
4. Submit a Program Proposal for the Master's Degree in the first quarter of enrollment.

Students who do not meet the standard course requirements (see the undergraduate curriculum) but who have unusual competence in other areas, such as earth systems science or space physics, may petition the geophysics faculty to arrange individual programs.

M.S. IN EXPLORATION AND DEVELOPMENT

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 geophysics, geology, physics, engineering, or mathematics; 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, G, H, J, K, L, M, S, T, U, V). Ph.D. candidates in Geophysics are required to complete Physics 121 or Electrical Engineering 142, 261; Engineering 102W, and Physics 210, 211, or Math. 220A, 220B, and five of the following: Geophysics 102, 174, 183, 195, 262, 284, 287, 288, or 290. Additional advanced courses are selected from the following topics: applied physics, astrophysics, atomic and nuclear physics, communications theory, computer sciences, civil engineering, chemical engineering, electromagnetic theory, engineering mechanics, geology, geophysics, 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 41A, 42A, or 44.

The candidate's record must indicate outstanding scholarship, and deficiencies in previous training must be improved. 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 essentially 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 "Advanced 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. DR:6(8)

3 units, Aut (Beroza, Segall) MWF 11
Win (Kovach) MWF 10

10. Continents Adrift: Plate Tectonics and the Geology of California — For prospective Earth Science majors and non-majors. Introduction to plate tectonics and geology using the geological evolution of California as an example of a mosaic of geological terranes which have been assembled and modified by the mechanisms of plate tectonics. Topics: plate geometry and the present distribution of faults, earthquakes and volcanoes; geological history of California and western N. America for the past 250 million years; evolution of the San Andreas fault system, causes and consequences of plate motion; the origin of the Sierra Nevada, Great Valley, and Coast Ranges; the geological future for California. Two Saturday field trips.

3 units, Spr (McWilliams)

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. Stu-
dents 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, given 1995-96

110. Geosphere — (Same as Earth Systems 110, Geological and Environmental Sciences 120.) 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, including 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, Zoback) MWF 9

111. Introduction to Computing in Earth Science — 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) MW 1:15

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 plane geometry, vectors, Geological and Environmental Sciences 1 or 2, or consent of instructor.

2-3 units (Sleep)
alternate years, given 1995-96

165. Geochronology — (Same as Geological and Environmental Sciences 165.) Introduction to principles of geochronology, thermochronology, the application of modern tools 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, annealing of fission tracks, neutron activation, a

magnetostratigraphy, and cosmogenic exposure ages. Alpha counting, mass spectrometry by gas source, solid source, and ion probe methods. Fundamentals of K-Ar, Ar-Ar, Rb-Sr and U-Pb, and fission track methods. Recommended: undergraduate training in calculus, chemistry, geology, and physics.

3 units, Spr (McWilliams) MWF 9

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 clean-up, civil engineering and siting of critical facilities. Surface-based and well-logging methods are reviewed. DR:6(8)

3 units, Spr (Zoback)
alternate years, not given 1995-96


3 units, Aut (Kovach, Beroza) MWF 9


3 units, Aut (Kovach, Graham, Roughgarden, TTh 10

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 (Klempner) MWF 10

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. Prerequisite: 182, or consent of instructor.

3 units, Win (Klempner, Graham) MWF 10

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 (Klempner) MWF 9
185A. Research Seminar: Reflection Seismology — Department research in reflection seismology and petroleum prospecting.
  1-2 units, Aut, Win, Spr (Claerbout)

185D. Research Seminar: Tectonophysics — Research in areas of current interest in rock mechanics, tectonophysics, and related problems. Content varies each quarter.
  1-2 units, Aut, Win, Spr (Mavko, Nur) by arrangement

185E. Research Seminar: Tectonics — Research topics on the origin, major structures, and tectonic processes of the earth’s crust. Emphasis on use of deep seismic reflection and refraction data.
  1-2 units, Aut, Win, Spr (Klemperer, Sleep, Thompson) MW 3-4:15

  1-2 units, Aut, Win, Spr (Sleep) by arrangement

  1-2 units, Aut, Win, Spr (McWilliams) by arrangement

  1-2 units, Aut, Win, Spr (Zoback) by arrangement

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) by arrangement

185M. Research Seminar: Earthquake Seismology — Research on earthquake source processes and seismotectonics.
  1-2 units, Aut, Win, Spr (Beroza) by arrangement

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) by arrangement

185T. Research Seminar: Crustal Deformation — Current research in crustal deformation with application to active tectonic and volcanic processes. Conventional and space techniques, data analysis, and inversion of surface data to constrain physical processes in the earth.
  1-2 units, Aut, Win, Spr (Segall) by arrangement

185U. Research Seminar: Fault Mechanics — Current research into the mechanics of faulting, fracture mechanics, friction, models of strain accumulation and post-seismic deformation, pore fluid effects, and induced seismicity.
  1-2 units, Aut, Win, Spr (Segall) by arrangement

185V. Research Seminar: Poroelasticity — 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 discussed: 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) by arrangement

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: calculus, first-year college physics. Recommended: Geological and Environmental Sciences 110.
  3-4 units, Aut (Sleep) MWF 11 lab by arrangement

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 under-
standing of the properties and processes of the interiors of the terrestrial planets. Emphasis on current unresolved problems, including the formation of the planets and their thermal histories.

3 units, Spr (Sleep) MWF 11
alternate years, not given 1995-96

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) by arrangement

215. Advanced Structural Geology and Rock Mechanics — (Same as Geological and Environmental Sciences 215.) Concepts and theories of rock deformation with application to structural geology, engineering geology, rock mechanics, and tectonophysics. Methods for analyzing stress, strain, and displacement fields in the earth. Governing equations of elastic plate theory are derived and applied to crustal flexure and multilayer bending. The governing equations of two-dimensional elasticity theory are derived and applied to tectonic loading and mechanisms of stress concentration. Introduction to the fundamentals of fracture mechanics. Prerequisites: elementary calculus, mechanics, and structural geology.

3-4 units Spr (Pollard) MWF 10
alternate years, not given 1995-96


3-4 units (Pollard)
alternate years, given 1995-96

262. Rock Physics — Properties of and processes in rocks as related to geophysical exploration, crustal studies, and tectonic processes. Emphasis on wave velocities and attenuation, hydraulic permeability; and electrical resistivity in rocks. Application to in situ problems, using lab data and theoretical results.

3 units, Win (Mavko) T 11-1 Th 11-12

276. Theoretical Seismology — Survey of modern methods in seismic wave propagation. Topics: anelastic attenuation, plane-wave propagation, anisotropy, propagator matrix techniques, generalized ray, reflectivity and full-wave theory, geometric ray theory, and related asymptotic techniques. Provides a rigorous introduction to these methods and a context for them in current research on earthquakes and earth structure. Prerequisite: 174.

3 units (Beroza)
alternate years, given 1995-96

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, Spr (Beroza, Segall)
alternate years, not given 1995-96

284. Imaging the Earth’s Interior — Extrapolation of wave fields through 2-D inhomogeneous media by finite difference and Fourier methods. Acoustic reflection imaging. Migration. Velocity estimation. Prerequisites: familiarity with convolution and Fourier transform; Physics 120, 121.

3 units, Spr (Claerbout) MWF 10

285. Seismogram Decomposition — Fourier transform, convolution, Z-plane, recognizing conjugate operators in physical processes and using them for inverse modeling by the conjugate-gradient method. Missing data, deconvolution, velocity spectra, near-surface irregularity, sample spectra of noise, spectral factorization, impedance, Q. Prerequisites: complex numbers, simultaneous equations.

3 units (Claerbout)
alternate years, given 1995-96

286. Three-Dimensional Filtering — How we improve our visualization and understanding of data cubes (Cartesian lattices of values) by filtering and related operations, e.g., signal is 1-D, image is 2-D, cube or movie is 3-D. Autoregression characterizes their covariance and spectra. Apply inverse theory by least-squares conjugate gradients. Identify signal and noise. Enhance or suppress striations. Restore sissing channels or frames in data cubes. Interpolate, extrapolate, regrid, seismic-sounding surveys, sea satellite altimetry, sea beam bathymetry. Computer labs.

3 units, Aut (Claerbout) MWF 10
alternate years, not given 1995-96

287. Earthquake Seismology — Review of earthquake source theory. Topics: elasticity, reciprocity, Green’s functions, seismic moment tensors, far-field approximations, source finiteness, scaling laws of earthquake source parameters, kinematics of earthquakes in the near-source region, source dy-
dynamics, and engineering aspects of seismology. Prerequisite: 174.
3 units, Spr (Beroza)
alternate years, not given 1995-96

288. Crustal Deformation — Collection, reduction, and analysis of crustal deformation measurements for the study of plate motion, earthquakes, and volcanoes. Data types include terrestrial geodetic methods (leveling, triangulation, laser distance measurements), and space methods (GPS, VLBI, SLR, and continuous strain instruments). Inverse methods for analyzing data. Prerequisite: 283 or equivalent.
3 units, Win (Segall)
alternate years, given 1995-96

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. Other 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, Spr (Segall)
alternate years, not given 1995-96

3 units, Win (Zoback)
alternate years, given 1995-96

380A. 1 unit, Aut (Klemperer) TTh 3:15-5
380B. 1 or 3 units, Aut (Klemperer) TTh 3:15-5

385A,D,E,G,H,J,K,L,M,S,T,U,V. 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 (Claerbout)
385D. Research Seminar: Rock Physics — See 185D.
1-2 units, Aut, Win, Spr (Mavko, Nur)
by arrangement
385E. Research Seminar: Tectonics — See 185E.
1-2 units, Aut, Win, Spr (Klemperer, Sleep, Thompson) MW 3-4:15
385G,H. Research Seminar: Earthquake Seismology and Global Tectonics — See 185G,H.
1-2 units, Aut, Win, Spr (Sleep)
by arrangement
385J. Research Seminar: Paleomagnetism, Geochronology, and Tectonics — See 185J.
1-2 units, Aut, Win, Spr (McWilliams)
by arrangement
385K. Research Seminar: Borehole Geophysics — See 185K.
1-2 units, Aut, Win, Spr (Zoback)
by arrangement
385L. Research Seminar: Seismotectonics — See 185L.
1-2 units, Aut, Win, Spr (Zoback)
by arrangement
385M. Research Seminar: Earthquake Seismology — See 185M.
1-2 units, Aut, Win, Spr (Beroza)
by arrangement
385S. Research Seminar: Seismic Tomography — See 185S.
1-2 units, Aut, Win, Spr (Harris)
by arrangement
385T. Research Seminar: Crustal Deformation — See 185T.
1-2 units, Aut, Win, Spr (Segall)
by arrangement
1-2 units, Aut, Win, Spr (Segall)
by arrangement
385V. Research Seminar: Poroelasticity — See 185V.
1-2 units, Aut, Win, Spr (Mavko)
by arrangement
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)
by arrangement

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) F 3:15
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)
by arrangement

400. Research in Geophysics
any quarter (Staff) by arrangement

PETROLEUM ENGINEERING

Emeriti: (Professors) William E. Brigham (on active duty), Alvah J. Horn, Sullivan S. Marsden, Jr., Frank G. Miller, Marshall B. Standing

Chair: Khalid Aziz
Associate Chair: Thomas A. Hewett
Assistant Professor: Martin J. Blunt
Professor (Research): F. John Fayers

Courtesy Professor: Stephan A. Graham, George M. Homsy

Acting Assistant Professor: Shaun Fitzgerald

Consulting Assistant Professors: Clayton Deutsch, Jane Woodward

Visiting Professors: Christine Economides, Vladimir Entov

Visiting Assistant Professor: Hans Kleppe

* 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; 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.

The department occupies portions of the Green Earth Sciences Research Building and the Ruth Wattis Mitchell 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 16 UNIX workstations and a number of microcomputers. All graduate students have a terminal at their desk.

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 Petroleum Engineering curriculum is certified by the Accreditation Board for Engineering and Technology (ABET); see the “School of Engineering” section of this bulletin for details. 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 a two-quarter course (Petroleum Engineering 180) in the final two quarters of 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 distribution, writing, and language requirements. The normal Petroleum Engineering undergraduate program automatically satisfies the University Distribution Requirements in area 4 (Mathematics), area 5 (Natural Sciences), and area 6 (Technology and Applied Sciences). 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>Engineering fundamentals</td>
<td>20-22</td>
</tr>
<tr>
<td>Mathematics</td>
<td>21</td>
</tr>
<tr>
<td>Science</td>
<td>24-25</td>
</tr>
<tr>
<td>Petroleum engineering depth</td>
<td>36-37</td>
</tr>
<tr>
<td>Distribution, writing, language, and electives</td>
<td>71-76</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. Calculus and Analytical Geometry and Math. 42. Calculus and Analytical Geometry</td>
<td>5</td>
</tr>
<tr>
<td>Math. 43. Calculus and Analytical Geometry</td>
<td>4</td>
</tr>
<tr>
<td>Math. 44. Calculus</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
</tr>
</tbody>
</table>

**SCIENCE**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<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. Planet Earth</td>
<td>4-5</td>
</tr>
<tr>
<td>Physics 51. Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>Physics 53. Electricity and Magnetism</td>
<td>4</td>
</tr>
<tr>
<td>Physics 54. Electricity and Magnetism Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>24-25</td>
</tr>
</tbody>
</table>

**ENGINEERING FUNDAMENTALS**

<table>
<thead>
<tr>
<th>Course</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>
<tr>
<td>Engr. 10A. Applied Mechanics</td>
<td>5</td>
</tr>
<tr>
<td>or Engr. 10. Applied Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>and Engr. 11. Mechanics of Materials</td>
<td>4</td>
</tr>
<tr>
<td>Engr. 30. Engineering Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>Mech. Engr. 33. Introductory Fluids Engineering</td>
<td>4</td>
</tr>
<tr>
<td>Pet. Engr. 167. Engineering Valuation of Oil and Gas Wells</td>
<td>3</td>
</tr>
<tr>
<td>or Engr. 60. Engineering Economics</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>20-22</td>
</tr>
</tbody>
</table>

* Students in junior- and senior-level petroleum engineering courses are assumed to have competence in Fortran.

**ENGINEERING DEPTH**

The following courses constitute the core program in Petroleum Engineering:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. Engr. 140. Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>or Chem. Engr. 160. Chemical Engineering Plant Design</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 180A. Chemical Engineering Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 180B. Chemical Engineering Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 111. Structural and Engineering Geology I</td>
<td>3</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 151. Sedimentary Geology and Petrography: Depositional Systems</td>
<td>4</td>
</tr>
<tr>
<td>Pet. Engr. 120. Reservoir Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 130. Well Log Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 140. Drilling and Completion Technology</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 175. Well Test Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 260. Groundwater Pollution and Oil Spills</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>36-37</td>
</tr>
</tbody>
</table>

A list of suggested electives and sample course programs are available in the Department of Petroleum Engineering, room 65, Green Earth Sciences Research 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 coursework and self-study and are expected to achieve fluency in the use of Fortran by their junior year.

**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 letter grade indicator (LGI) 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 petro-
leum 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 adviser 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 LGI 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 coterminous 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 should take the Graduate Record Examination (GRE). Typically, at least a 3.25 LGI in engineering, science, and mathematics, and a 3.0 LGI 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 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 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 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 two 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.

MASTER OF SCIENCE

The objective is to prepare the student for professional work in the energy industry through completion of fundamental courses, both in the major field and in related sciences, and independent research.

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 LGI of 3.0. This requirement is satisfied by taking the core sequence, selecting two of the four 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.
4. Students entering without an undergraduate degree in Petroleum Engineering may 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>Pet. Engr. 175, Well Test Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>
ELECTIVE SEQUENCES

Choose two of the following:

Enhanced Recovery:
- Pet. Engr. 251. Thermodynamics of Phase Equilibria 3
- Pet. Engr. 280A. Waterflooding 3
- Pet. Engr. 280B. Miscible Flooding 3
- Pet. Engr. 280C. Thermal Recovery Methods 3

Total 12

Geostatistics and Reservoir Modeling:
- Geol. & Envir. Sci. 151. Sedimentary Geology and Petrography: Depositional Systems 3
- Geophys. 180. Geological Interpretation of Reflection Seismograms 3
- Pet. Engr. 130. Well Log Analysis I 3

Total 17-19

Petroleum Geology:
- Geol. & Envir. Sci. 247. Oil Field Exploration and Development 3
- Geol. & Envir. Sci. 251. Sedimentary Basins 3
- Geol. & Envir. Sci. 253. Petroleum Geology and Exploration 3
- Pet. Engr. 251. Thermodynamics of Phase Equilibria 3

Total 12

Reservoir Performance:
- Pet. Engr. 251. Thermodynamics of Phase Equilibria 3
- Pet. Engr. 271. Advanced Reservoir Simulation 3-4

Total 13-16

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. 180. Geologic Interpretation of Reflection Seismograms 3
- Geophys. 190. General Geophysics 4
- Pet. Engr. 211. Computer Applications for Engineers 1
- Pet. Engr. 269. Geothermal Reservoir Engineering 3

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 90 required units can be applied to overcoming deficiencies in undergraduate training.

At least 30 units in engineering and closely allied fields must be taken in advanced work, that is, work beyond the master's degree requirements and in addition to research (Pet. Engr. 360). These may include courses from the Ph.D. degree list below or advanced-level courses from other departments with consent of the adviser. The student must have an average LGI of 3.0 in courses taken in the School of Earth Sciences. A thesis based on 15 units of research must be submitted and approved by 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. In all other courses, the student must maintain an average LGI of 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. Ordinarily, 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 45 units of course work and 27 units of research. The 45 units of course work may include graduate courses in petroleum engineering and courses selected from the following list. Other courses may be approved by the adviser.

MATH AND APPLIED MATH

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aero. &amp; Astro. 192. Vector and Tensor Analysis</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. 137. Numerical Analysis</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>
</tr>
</tbody>
</table>

SCIENCE

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geol. &amp; Envir. Sci. 231. Introduction to Groundwater Solute Transport</td>
<td>4</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 247. Oil Field Exploration and Development</td>
<td>3</td>
</tr>
</tbody>
</table>

Geol. & Envir. Sci. 265. Surfaces and Interfaces | 3 |
Geophys. 180. Geologic Interpretation of Reflection Seismograms | 3 |
Geophys. 190. General Geophysics | 4 |
Geophys. 262. Rock Physics | 3 |
Pet. Engr. 242. Topics in Advanced Geostatistics | 4 |

ENGINEERING

Chem. Engr. 140. Fluid Mechanics | 3 |
Chem. Engr. 221. Transport Phenomena I | 3 |
Chem. Engr. 222. Transport Phenomena II | 3 |
Engr. 298. Seminar in Fluid Mechanics | 1 |
Mech. Engr. 250. Introduction to Heat Transfer | 4 |
Mech. Engr. 252A. Convective Heat and Mass Transfer | 3 |

The Ph.D. program is normally a four-year program. Except in unusual circumstances, the first year is spent in fulfilling the requirements for the M.S. degree. During the second and the third years, the student acquires a minimum of 45 units of credit in courses approved by the department faculty. Teaching experience (Pet. Engr. 359) is a requirement for the Ph.D. degree. During the second and third years, the student also completes a minimum of 27 units of research. After selecting a problem, the student begins the research work by making a literature survey and by formalizing research objectives. In the fourth year, the student works full-time on completing research and writing the dissertation.

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 a written and an oral part. 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.

The student's record must indicate outstanding scholarship. The student must pass the department's qualifying examination, 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 in-
dependent 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 270A and 270B. The remaining courses should be selected from 175, 180, 271, 275, 280A, 280B, 280C, 281, and 282.

COURSES

103. Energy Resources — Comprehensive overview of primary sources of energy (oil, natural gas, coal, nuclear, and hydroelectric) and emerging sources such as solar, wind, geothermal, cogeneration, and conservation. Provides basic technical understanding of how each resource generates energy, the history of development and an evaluation of economic, environmental, technical and political factors that affect supply and demand. DR:6(8)

  3 units, Aut, Spr (Woodward) MWF 9

104. Seminar: The Coming Energy Revolution — Explores different views of the three forces that are driving an energy revolution: environmental pressures, economic and social revolution, and technological change. Emphasis is on an efficient, decentralized energy economy that relies on advanced technologies and renewable resources. Students submit a significant paper for third unit.

  2-3 units, Aut (Woodward) T 7:30-9:30 p.m.


  3 units, Aut (Blunt) MWF 2:15

130. Well Log Analysis I — Interdisciplinary course for earth scientists and engineers, providing a practical understanding of the interpretation of well logs using real field examples. Lectures, problems. Methods for evaluating commercial significance or rock formations penetrated in exploratory drilling. First of two parts, concentrating on the fundamentals of all types of logs including electric and nonelectric logs.

  3 units, Aut (Lindblom) TTh 10-11:15

131. Well Log Analysis II — Second part of 130 series. Concentrates on quantitative and interpretative techniques for all types of logs of boreholes drilled in various oil and gas basins. Guest lecturers discuss specific open and cased hole log applications.

  2 units, Win (Lindblom) W 2:15-4:30

140. Drilling and Completion Technology — Principles applied to the drilling and completion of oil, gas, and geothermal wells for offshore 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 1994-95

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 geostatistics, for data integration and solution.

  2 units, Aut (Deutsch) M 3:15-5:15


  1 unit, any quarter (Staff) by arrangement

167. 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. Prerequisite: consent of instructor.

  3 units, Win (Kourt) M 2:15-5:05


  3 units, Aut (Aziz) MWF 8


  3 units, Spr (Economides) MWF 8

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, 172 or 272.

3-4 units, Win, Spr (Meehan) Th 1:15-4:05
192. Undergraduate Teaching Experience — Leading field trips, preparing lecture notes, quizzes under supervision of the instructor.
1-3 units, any quarter (Staff) by arrangement
193. Undergraduate Research Problems — Original and guided research problems with comprehensive report.
1-3 units, any quarter (Staff) by arrangement
1-3 units, any quarter (Staff) by arrangement
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. Focuses on X-Windows, use of graphics, interlanguage communication, and user interfaces.
1 unit (Horne) not given 1994-95
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 heterogeneities. Case studies from the oil industry and environmental sciences. Prerequisites: introductory calculus and linear algebra, Statistics 116 or equivalent.
4-5 units, Win (Journal) TTh 10-12
241. Practice of Geostatistics on Exhaustive Databases — (Same as Geological and Environmental Sciences 241.) Based on a numerical model of a deposit/reservoir. Student teams receive a budget for drillholes and the same geological information. The deposit is studied through maps, variograms, kriging. Economic feasibility is performed from the estimates of recoverable reserves. All results are checked against underlying reality. Prerequisites: 240, Fortran/Unix.
4-5 units, Spr (Journal) MW 1:15-3:05
242. Topics in Advanced Geostatistics — (Same as Geological and Environmental Sciences 242A,C.) Topics chosen from 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. Prerequisites: 240, advanced calculus, Fortran/Unix.
4 units (Journal) not given 1994-95
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 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 (Harbaugh, Kourt) not given 1994-95
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) not given 1994-95
3 units, Spr (Orr) TTh 9:30-10:50
255. Report on Energy Industry Training — Provides on-the-job training 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 (Staff) by arrangement
slicks at sea. Methods for containing and removing the spill and cleaning of polluted beaches.

3 units, Win (Blunt) MWF 1:15

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.

4 units, Win (Kourt) M 2:15-5:05

268. Seminar in Petroleum Engineering
1 unit, any quarter (Staff) by arrangement

269. Geothermal Reservoir Engineering — Steam well deliverability measurement, forecasting, and steam reserves determination and forecasting. Interpretation of downhole pressure and temperature profiles. Vapor and liquid-dominated systems. Wellbore heat transmission, static and flowing pressures in wells, flow metering. Field problems and examples.

3 units, Win (Fitzgerald) MWF 8


3 units, Win (Hewett) MWF 10


3 units, Spr (Hewett) MWF 10


3-4 units, Win (Aziz) MWF 11


3 units, Aut (Aziz) MWF 8

1-3 units, any quarter (Staff) by arrangement


3 units, Spr (Economides) MWF 8


3 units, Spr (Fayers) MWF 1:15


3 units, Aut (Entov) MWF 10


3 units, Win (Castanier) TTh 8:30-9:50


3 units (Horne) not given 1994-95

282. Capillary and Interfacial Phenomena — Lectures, problems, some demonstrations. Thermody-
namic and mechanics of interfaces, surface tension and the Laplace equation. Excess energy at interfaces, Gibbs adsorption. Vapor pressure of curved interfaces, Kelvin equation. Wetting of surfaces, contact angle analysis, Young’s equation. Adsorption, hysteresis, and the Marangoni effect. Application to capillary pressure curves, flow in porous media and enhanced oil recovery.

3 units (Staff) not given 1994-95

285A, B, C, D, E. Research Seminars — Focused study in areas of research 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 — Special drilling, production, or reservoir engineering subjects.
1 unit, Aut, Win, Spr (Staff)
by arrangement

1 unit, Aut, Win, Spr (Castanier)
by arrangement

1 unit, Aut, Win, Spr (Horne)
by arrangement

285D. Research Seminar: Reservoir Simulation — Current research in SUPRI-B (Reservoir Simulation) program.
1 unit, Win (Aziz) by arrangement

285E. Research Seminar: Well-Test Analysis
1 unit, any quarter (Horne)
by arrangement

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) by arrangement

any quarter (Staff) by arrangement

Dean: Richard J. Shaulelson; Interim Dean: Myra Strober (Autumn)

Associate Dean for Academic Affairs: Myra H. Strober

Associate Dean for External Relations: Maureen McNulty

Associate Dean for Administration: Vicki Oldberg

Assistant Dean: Ralph Keller (Alumni Relations)


Associate Professors: Rafael M. Diaz, Jane Hännaway, Teresa D. LaFromboise, David Rogosa

Assistant Professors: Clea Fernandez, Patricia J. Gumport, Melanie Sperling


Acting Assistant Professors: Steven Athanases, Benson Honig

Consulting Professor: David Fetterman

Consulting Associate Professors: Shelley Goldman, Rosemarie Moore, Peter Pearson, Dolores Gallagher Thompson

Consulting Assistant Professors: Douglas Rait, Jeremy Roschelle

*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 and Educational Practice (SSEP)

These committees function as administrative units that act on admissions, plan course offerings, assign advisers, and set program requirements within their areas. Various subspecialties are offered in most program areas. Faculty members are primarily affiliated with one program, but 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 Information.

OFFERINGS

The School of Education prepares scholars, teachers, supervisors, counseling psychologists, policy analysts, researchers, administrators, and other educational specialists. Five graduate degrees with specialization in education are granted by the University: Master of Arts, Master of Arts in Teaching (Subject), Educational Specialist, Doctor of Education, and Doctor of Philosophy. While no undergraduate majors are offered, an undergraduate honors program and courses are available to undergraduates. The School of Education jointly offers an undergraduate concentration in Children and Society and provides tutoring opportunities in conjunction with the Haas Center.

The school provides appropriate course work and programs in teaching and administration 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.

Students interested in credentials must contact the STEP office in the School of Education during their first quarter of study. 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 bulletin Summer at Stanford issued each year in January. The school offers no correspondence or extension courses.

UNDERGRADUATE PROGRAM

The school focuses on graduate education and research training and does not offer an undergraduate major. However, undergraduate education is receiving increased attention in the school, and programs are available to those interested in the field of education. Several courses at the 100 level are especially designed for undergraduates. An honors program is available to undergraduates and, in conjunction with the Haas Center, offers a variety of tutoring opportunities for undergraduates interested in developing educationally oriented skills. Undergraduates are also encouraged to explore admission to coterminal and master's degree programs such as the Master of Arts degree in Education described below.

CHILDREN AND SOCIETY CURRICULUM

The Children and Society Curriculum is an undergraduate concentration sponsored jointly by the Center for the Study of Families, Children, and Youth 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:


One course or a directed reading, with either a faculty member in Education or in the major department, that relates the major to an education issue is also required. Additional meetings are required in the Autumn and Winter Quarters, as is a 1-unit honors seminar, Education 199, taken every quarter the student is in the program.

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 BACHELOR'S AND MASTER'S DEGREE PROGRAM

The School of Education admits students from undergraduate departments within the University into a coterminal A.B. and A.M. program. Students in such a program receive the bachelor's degree in their undergraduate major and the A.M. 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, the Registrar’s Office 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 “Advanced Degrees” section of this bulletin. Students are urged to carefully read this section 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 to Graduate Admissions, the Registrar’s Office, Stanford University, Stanford, CA 94305-3005. The admissions packet includes the publication School of Education Information, which outlines degrees, programs, admission and graduation requirements, and research interests of the faculty; a reprint of the School of Education section of the bulletin Courses, Degrees, and Information, 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 letter grade indicator (LGI) 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 publication School of Education Information. Upon admission, each student is assigned an adviser 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 and Educational Practice
  - Gender Education
  - Higher Education Administration
  - International Development Education
  - International Educational Administration and Policy Analysis
  - Joint Program with Graduate School of Business
  - Policy Analysis
  - Prospective Principal’s Program
- Social Sciences in Education (Interdisciplinary)
- Curriculum Studies and Teacher Education
- Curriculum Areas (Art, Dance, Social Studies Education, Science)
- General Curriculum Studies
- Teacher Education
- Language, Literacy, and Culture
- Bilingual Education
- Language Policy
- Second Language Education
- Writing, Reading, and Language—English
- Psychological Studies in Education
- Health Psychology Education
- Stanford Teacher Education Program

PROSPECTIVE PRINCIPAL’S PROGRAM

The Prospective Principal’s 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 self 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. The master’s degree requires 45 quarter units. In order to qualify for the credential, a total of 48 quarter units, including internship units, are necessary. Additional information regarding admission requirements, course work, and credential requirements is available in the publication School of Education Information.
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, Latin, Spanish), mathematics, science (life science, physical science), 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 summer school programs based at Stanford and nearby schools. 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.

STEP also includes the California Cross-Cultural Language and Academic Development (CLAD) emphasis program. CLAD provides enhanced 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 publication School of Education Information.

MASTER OF ARTS, TEACHING (SUBJECT)

The degree of Master of Arts, Teaching (M.A.T.) is reserved for experienced teachers or for individuals who have previously completed a program of teacher preparation. In 1994-95, it is offered jointly by the School of Education and academic departments such as Art, Biology, French and Italian, German Studies, History, Latin American Studies, Mathematics, Physics, and Slavic Languages and Literatures. In addition to these fields, it is possible for candidates to work out special programs in other areas. In 1994-95, M.A.T. programs will not be offered in Chemistry, English, Political Science, and Sociology. Applicants must have:

1. Completed a bachelor's degree with an acceptable letter grade indicator (LGI) to qualify for graduate study. The department of the major teaching field determines the adequacy of this preparation. The School of Education determines the adequacy of the candidate's background in professional education. The candidate must be admitted to the program by both the department of the teaching major and the School of Education.

2. Teaching experience.

General requirements for the degree are:

1. Three quarters of full-tuition registration (or equivalent in partial tuition quarters). Only one quarter of nonmatriculated study may be counted toward the residency requirement for this degree.

2. A minimum of 45 quarter units of graduate study, at least 36 of which must be completed at Stanford.

3. A minimum of 25 units of the courses must be taken for the M.A.T. degree in the teaching field of concentration.

4. At least 12 units of the graduate course M.A.T. degree requirements must be taken in the Stanford School of Education. Certain courses cross-listed in two departments may be used to satisfy requirements in either the academic department or the School of Education, but the same course may not be used to meet requirements in both departments. Requirements for the School of Education consist of courses in the following areas that supplement the candidate's preparation:
   a) Methods in the candidate's teaching field.
   b) A course in curriculum.
   c) Recent work in psychological or social foundations. (If both have been completed elsewhere, other work in the foundation fields — history, philosophy, comparative education, and so on — must be selected in consultation with the adviser in the School of Education.)

5. Requirements in the major teaching field are determined by the major department, and the program of professional courses by the School of Education. The program proposal for the degree must be signed by representatives of both the academic department and the School of Education.

6. The candidate must achieve an LGI of at least 'B' in approved Stanford courses in the teaching subject and in professional education, or grades in these courses equivalent to those required for the academic department's Master of Arts degree.
are equivalent with respect to the amount of time intended careers of those who pursue them. They differ in emphasis, purpose, and the requirements during their first year.

obtain information about procedures and require- by the end of their second year of study and should constitute admission to candidacy for the degree. (2) those who wish a scholarly preparation for teaching education in colleges or universities. The Ed.D. degree is offered only in the concentrations of Policy Analysis and Higher Education Administration within the area of SSEP.

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. The Ed.D. degree is offered only in the concentrations of Policy Analysis and Higher Education Administration within the area of SSEP.

Ph.D. students must complete a minor in another discipline, hold an acceptable master’s degree outside the field of education, or complete an approved distributed minor. A minor is not required for the Ed.D.

Doctoral students should plan to specialize in the field of their professional interest, preparing for some line of professional activity while mastering an organized body of knowledge. With the flexibility offered in programs, students are encouraged to design a course of study relevant and meaningful to their interests and professional objectives.

Upon admission, an adviser assigned from the admitting area committee works with the student to establish an appropriate course of study and project research plans. Other faculty members may also be consulted to aid 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 publication School of Education Information. Complete guidelines may be obtained from the specific area committees.

The program concentrations for doctoral study are as follows:

Social Sciences and Educational Practice
Anthropology of Education
Economics of Education
Higher Education Administration
History of Education
International Development Education
Philosophy of Education
Policy Analysis

EDUCATIONAL SPECIALIST

The degree of Educational Specialist (Ed.S.) is offered occasionally. The Ed.S. degree requires 45 quarter units beyond the master’s degree (or its equivalent) and includes field-based project work. The University requirement of three full tuition quarters in residence at Stanford also applies. Additional information about admission and program requirements is available in the publication School of Education Information.

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 SSEP. 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 tuition 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. (If more than 72 are needed to meet particular Program Area requirements, students may transfer up to 36 units of 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.

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. The Ed.D. degree is offered only in the concentrations of Policy Analysis and Higher Education Administration within the area of SSEP.

The Ph.D. students must complete a minor in another discipline, hold an acceptable master’s degree outside the field of education, or complete an approved distributed minor. A minor is not required for the Ed.D.

Doctoral students should plan to specialize in the field of their professional interest, preparing for some line of professional activity while mastering an organized body of knowledge. With the flexibility offered in programs, students are encouraged to design a course of study relevant and meaningful to their interests and professional objectives.

Upon admission, an adviser assigned from the admitting area committee works with the student to establish an appropriate course of study and project research plans. Other faculty members may also be consulted to aid 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 publication School of Education Information. Complete guidelines may be obtained from the specific area committees.

The program concentrations for doctoral study are as follows:

Social Sciences and Educational Practice
Anthropology of Education
Economics of Education
Higher Education Administration
History of Education
International Development Education
Philosophy of Education
Policy Analysis
Social Sciences in Education (Interdisciplinary)
Sociology of Education
Curriculum Studies and Teacher Education:
Curriculum Areas (Art, English, Science, Social Studies)
General Curriculum Studies
Teacher Education
Language, Literacy, and Culture
Bilingual Education
Language Policy
Second Language Education
Writing, Reading, and Language — English
Psychological Studies in Education
Child and Adolescent Development
Counseling Psychology
Educational Psychology
Special Programs
Jewish Education
Symbolic Systems in Education

Ph.D. MINOR
Candidates for the Ph.D. degree in other departments or schools of the University may elect to minor in Education. Requirements include a minimum of 30 quarter units of graduate course work in Education and a clear field of concentration. Students choosing to minor in education should meet with the relevant area chair to determine a suitable course of study early in their program.

COURSES
OTHER DIVISIONS OF THE UNIVERSITY
Teachers, administrators, 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. Students 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 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 offered once or 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 — For students currently in leadership positions in student organizations or residences or those who have jobs or volunteer roles where they are working in groups. Explores basic theories and concepts of leadership and group process using cross-cultural perspective to identify one’s own leadership style and skills and to use them effectively: to develop and improve skills in the areas of group process, decision making, effective communication and community building; and to develop a personal approach to effective leadership at Stanford and in the future. Enrollment limited to 30. Priority given to undergraduates followed by A.M. students.

3 units, Win (Porteus) Th 2:15-5:05

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 socio-economically and ethnically diverse populations in a variety of subjects. Required concurrent tutoring placements. (SSEP)

3 units, Win (Staff) M 4:15-5:45

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 aid required.

3 units, Aut, Win (Takemoto) W 4:15-5:45

102. Culture, Class, and Educational Opportunity — Upward Bound and EPASSA counselors work with students from educational 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) TTh 2:15-4:05

103X. Multimedia Production Skills — Basic skills of multimedia production are taught in workshops. Multimedia design procedures including information organization, navigation, screen layout, and user-control. Students, working on group projects, digitize and edit sounds, images, and video and develop multimedia compositions using video editing and hypertext composition software.

1 unit, Aut (Kerns) F 1:15-4:05

104. Psychosocial Aspects of Aging — Survey of common stressors of middle age and later life, and coping strategies employed to address them. De-
pression and dementia: manifestation, etiology and treatment, present research gaps, successful intervention used with individual patients and/or family members to reduce burden and stress. Interface between physical and mental health topics (e.g., health promotion) by guest lectures. Issues in long term care (alternatives to nursing home placements for those in need of extensive physical and emotional support). Hypothesizes why some middle age and older adults develop significantly psychological problems while others with the same kinds of stressors do not. Supervised field work is required at one of several local senior service agencies.

4 units (Thompson) not given 1994-95

105. American Education and Public Policy — (Graduate students register for 215; same as History 158B, Political Science 186K.) 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. (SSE/APA) 3 units, Aut (Kirst, Tyack) MW 2:15 and by arrangement

110X. Urban Youth and Their Institutions: Research and Practice — 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. (APA) 5 units, Aut (Kirst, Tyack) MW 2:15 MW 1:15

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 topics of importance in the social sciences: explaining human action, the functional explanation of social phenomena, and holistic vs. reductionist orientations. Examples for contemporary social science research literature. (SSE) 3 units, Aut (Phillips) T 7-9:30 p.m. alternate years, not given 1995-96

120. Problems of Intelligence, Information, and Learning — (Same as Symbolic Systems 20.) Introduction to studies of intelligent reasoning, knowledge, understanding, representation, and meaning. Results of computational, linguistic, philosophical, and psychological research discussed and compared. Relevance of material to instruction and learning. (PSE) DR:9(4)

4 units (Greene) not given 1994-95

131. The Economics of Gender — Economic and policy issues concerning the role of gender. Topics: labor force participation and attachment, earnings, discrimination, occupational segregation, housework, child care, affirmative action, comparable worth, and an introduction to the new feminist economics. (SSE) 4 units (Strober) not given 1994-95

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.

5 units, Spr (Steyer) WThF 11-12:30

144X. Understanding Research on Children and Schools — Citizens concerned with children's well-being depend on several sources to gauge the effectiveness of various policy options: media, government analyses, scholarly reports, etc. The contradictory findings from school research is confusing and frustrating. Is student achievement declining, staying steady, or improving? Does Head Start help? Can standardized tests be trusted? Concepts and skills are developed to guide consumers of research on children and schools across a range of problems, conceptualizations, methods, and interpretations. Problem-based, covering quantitative and qualitative methods.

5 units, Win (Calfee) MW 3:15-5:05

145X. Promoting Sexual Responsibility in the Era of AIDS — (Same as 245X.) Enrollment limited to SUSE graduate students, STEP students, and advanced undergraduates. (PSE) 5 units, Spr (Diaz) Th 4:15-6:05

149X. Theory and Issues in the Study of Bilingualism — (Same as 249, Spanish and Portuguese 207.) Key issues in the study of bilingualism from a sociolinguistic perspective. Emphasis 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 (Valdes) Th 3:15-6:05

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 (Haertel) not given 1994-95

161. Introduction to Teaching and Learning in Asia — Preparation for transcultural living and teaching experiences. Emphasis on knowledge of Asian history and culture; skills required for living in an Asian community; and role played by American culture in shaping one's own attitudes, values, and behavior. Prerequisite: consent of instructor. (IDE)
3 units, Spr (Valdes) MW 10:30-12:05

163X. Technology Policy, Knowledge Formation, and Economic Development — The nature of national policies toward economic development information technology. The impact this technology, set in the context of those policies, has on the kinds of skills demanded in the labor force and the production of knowledge. (IDE, SSE)
2-5 units (Carnoy) alternate years, given 1995-96

165X. History of Higher Education in the U.S. — (Same as Education 265X, History 166/366.) From the founding of Harvard in 1636 to the present, with emphasis on institutional development, governance, and evolving purposes and clientele.
3-5 units, Spr (Lyman) MW 9-10:50

170. Gender and Education — (Same as Sociology 132, Feminist Studies 130.) 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. (SSEP)
4 units, Spr (E. Cohen) MW 3:15-5:05 alternate years, not given 1995-96

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.
3 units Spr (Thoresen, Pertofsky) MW 3:15-5:05

173X. Peace Studies — (Same as History 154, Political Science 133, Psychology 142, Sociology 108.) 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. Lectures on how our world is changing, the nature of peace and peaceful processes; peace at the operational level (the causes of war, building negative peace, building positive peace); peace — moral and normative considerations; peace and you. (All Areas)
5 units, Spr (Bernstein, Bland, Dreikmeier, Holloway, Moses, Noddings, Ross) MTW 1:15 and by arrangement

175A,B. Experiential Curricula — Two-quarter sequence.
175A. The Case of Wilderness Education — The use of experiential education in elementary and secondary school curricula. Through a study of wilderness education, investigates the benefits and weaknesses of experiential teaching and learning including: group cohesion in the classroom, changes in student-teacher and student-student relationships, collateral learning, and contagion. Discussion of varied conceptual frameworks for alternative education from Dewey, Bereiter, and Illich. Enrollment limited. Fee: $95. (CTE)
2-4 units (Westheimer) not given 1994-95

175B. Issues in Implementation — The moral, ethical, and practical issues raised by experiential philosophies and techniques. Relationship between emotional and ethical boundaries of experiential curricula and student-teacher affirmation in the classroom. Bridges research and practice through curricula designed and implemented for local high school students. Fee: $95. (CTE)
2-4 units (Westheimer) not given 1994-95

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. Readings and problem-based learning approach to solving spiritually-related problems in elementary spiritual practice. Educational tools and guided practice are applicable in one’s personal and professional life. Limited enrollment. Prerequisite: consent of instructor. (PSE).

- 3 units, Win (Thoresen) W 1:15-3:05 and by arrangement

180. Directed Reading in Education — For undergraduates and master's degree students. (All Areas)

- any quarter (Staff) by arrangement

190. Directed Research in Education — For undergraduates and master's degree students. (All Areas)

- any quarter (Staff) by arrangement

191X. Introduction to Educational Statistics in Research — Introduction to data analysis and statistical principles for educational research. Corequisite: Statistics 190. (PSE)

- 2 units, Aut (Rogosa) Th 11-12:30

197. Education and the Status of Women: Comparative Perspective — (Same as Sociology 134, Feminist Studies 139A.) 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. (SSEP) DR:9f(4 or 5)

- 4-5 units, Win (Ramirez) MWF 11-12:30

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.

- 1 unit, Aut, Win, Spr (Diaz) T 3:15-5:05

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. (SSEP)

- 3 units, Spr (Tyack) MW 11 and by arrangement

202X. Introduction to the Study of International Comparative Education — Required for all A.M. students in IDE, others by consent of instructor. Orientation to the A.M. program and research project, exploration of resources for study and research at Stanford. (IDE)

- 2-5 units, Aut (Ramirez, Honig) M 3:15-5:05 bi-weekly

204. Introduction to Philosophy of Education — Introduces current approaches and techniques in philosophy of education; material has been selected for its general relevance to students of education. Attention to feminist and radical theories of education. Introductory philosophical material is presented in the context of issues concerning the curriculum. (SSE)

- 4 units, Win (Noddings) TTh 8-9:50

206B. Project Workshop in International and Comparative Education — The conclusion of the four-quarter A.M. program in IDE, required of all A.M. students. Organized around the students’ “Master Project” and provides in-depth reviews of draft project reports. The final version of the report is due at the end of the course. (IDE)

- 2-5 units, Sum (Honig) W 2:15-4:05

206X. Applied Research Methods in International and Comparative Education — Required for all A.M. students in IDE and IEAPA; others by consent of instructor. Enhances skills in undertaking independent research in international development education through a combination of reading and discussion of the methodological issues most relevant to the field. (IDE)

- 3-5 units, Win (Honig) TTh 2:15-4:05

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. (IDE, SSE, APA)

- 3-5 units, Spr (Honig) TTh 3:15-5:05

208A. Introduction to Curriculum — Curriculum theory and the history of curriculum as a field of study. Aims and objectives, pre-active and interactive views, explicit and implicit curricula, introduction to problems of program evaluation. (CTE)

- 4 units, Win (Eisner) MW 9-10:50

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 (Walker) T 7-10 p.m.

208C. Introduction to Curriculum — 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 (Walker) not given 1994-95

209X. Communities of Learning: Recasting Relationships in the Classroom and School — Investigates theory, policy, and practice of efforts to build community in schools. What is the role of experi-
ence, organization, and context in community-building? What are the assumptions and consequences for schools? Discussion of varied conceptual frameworks for alternative education and school organization from Dewey, Gardner, Sergiovanni, and Goodlad. Enrollment limited. Fee: $55. (CTE)

4 units, Aut (Westheimer) T 7-9:30 p.m.

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 learning, and the social structure of the classroom. Reading and evaluating social sciences research. Short written assignments and individual feedback. (SSEP)

4 units, Win (Cohen) MW 3:15-5:05

211X. Research Methods in Statistical Inquiry — Seminar provides a directed, hands-on forum for SSEP students to critically examine the process of developing and shaping a research program, integrating it with academic and field experiences, and building relationships that carry students beyond the end of their program. Helps students conceptualize their projects, and focus on researchable topics such as: effective revising and editing, job searches, working with your adviser, “what next?,” or a fun celebration of our achievements so far. Prerequisite: SSEP master’s students.

1 unit, Win (Staff) T 2:15-4:05

212X. Designing Group-Work for Heterogeneous Classrooms — Minicourse for STEP interns. Theory and research on cooperative learning, and recent work on creating multiple ability curricula and treating status problems in classes that have a wide academic range. Four two-hour classes using lecture, videotapes, and small group formats where students apply concepts to practical curricular and instructional problems. Pairs of students teach, evaluate, and write multiple ability group-work classes as a final assignment. Prerequisite: STEP intern. (STEP)

1 unit, Spr (Lotan) TTh 1:15-3:05

213. Aesthetic Foundations of Education — What is meant by “the art” of teaching. Major conceptions of art and their contribution to cognitive development, to human understanding, and to the role that the arts can play in education. (CTE)

4 units, Aut (Eisner) MW 9-10:50

alternate years, not given 1995-96

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. (SSE)

3 units (Phillips) given 1995-96

215. American Education and Public Policy — (Same as History 158B, Political Science 186K.) For graduate students. See 105. (APA)

3 units, Aut (Kirst, Tyack) MW 2:15 and by arrangement

216X. Survey of Educational Research Methods — For first-year LLC 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)

3-4 units, Aut, Win, Spr (Calfee)

MWF 8:30-9:50

218. Society, Education, and Dance — (Same as Dance 268.) 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. (CTE)

DR:7(2)

3-5 units (Cashion, Ross) not given 1994-95

219. Artistic Development of the Child — Introduces research in the behavioral sciences having relevance for understanding the child’s artistic development. (CTE)

4 units (Eisner)

alternate years, given 1995-96

220A,B,C,D,Y. The Social Sciences and Educational Analysis — Required of students in APA and open to all. Relationships among economics, political science, and sociology and their applications to education in the U.S. Each quarter emphasizes the contribution of a particular social science but stresses the interrelationships among the social sciences.

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 are required to enroll in 220Y for one additional unit of credit. (APA, SSE)

4 units, Aut (Levin) MW 9-10:50

220B. Introduction to the Politics of Educational Analysis — (Same as Political Science 187.) 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 APA. (APA, SSE)

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. (APA, SSE)

220D. History of School Reform: Origins, Policies, and Outcomes — 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. (APA, SSE)

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. (APA, SSE)

1 unit (Strober) not given 1994-95

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: to 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. (APA)

5 units, Win (McLaughlin) MW 1:15-3:05

222. Resource Allocation in Education — Open to APA master's students only. 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. Attention to sensitivity of implications to model assumptions. (APA)

3 units, Spr (Levin) MW 1:15-3:05

223. Effective Schools: Research, Policy, and Practice — Examination of recent studies of schools that exceed expectations in producing high student achievement. Research methodologies, results of studies, and efforts to implement results. Components of effective schools analyzed: effective teaching, principal leadership, organizational processes, parent involvement, role of superintendent. Required project studies a school and determines effectiveness. (APA, CTE)

3-4 units, Sum (Cuban) MTWTh 9-11:30 alternate years, not given 1995-96

224. Information Technology in the Classroom — Use of information technology (computers, interactive video, telecommunications) in secondary school classroom teaching. Basic computer operations and terminology; the 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. (CTE, STEP)

3 units, Spr (Walker) TTh 4:15-6:05 and by arrangement

225X. 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. (APA)

4 units, Win (Massy) MW 3:15-5:05

226X. Classroom Testing — 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 (Haertel) not given 1994-95
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) alternate years, not given 1994-95

228. Psychology of Literacy — For doctoral and master's students in LLC, PSE, CTE, and SSEP. 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, Win (Calfee) MW 11-12:30

229. The Development of Human Competence: Theory, Research, and Practice — Conceptions of effective personal and social functioning, and research on psychological and educational processes associated with the development of human competence. Introduces a conceptual framework for understanding humans as self-organizing, self-constructing living systems and provides a set of principles for intervening to enhance competence from infancy to adulthood. (PSE) 4 units (Staff) not given 1994-95

231X. Campus Cultures — Preference given to MA/HE cohort. Examines ways to recognize and understand the distinctive characteristics of colleges and universities. How an institution's culture shapes its programs, services, policies, governance, and ways of doing things. Seminar on the methods and results of the College Experiences Study and from the collegiate and professional experiences of seminar members themselves. Prerequisite: consent of instructor. (SSEP) 4 units, Win (Lyons) Th 9-12

233. Seminar in Multicultural Counseling— (Same as Psychology 235.) How the New World experience has affected the adaptive strategies, acculturation patterns, family structure, and support systems of African Americans, American Indians, Asian/Pacific Islanders, and Hispanic Americans. Analyses of: the theory and practice of cross-cultural counseling, the cultural appropriateness of present mental health service delivery approaches, alternatives to individual counseling interviews, and the process of culturally adapting counseling interventions. Emphasis on cross-cultural counseling competence with ethnic minorities. (PSE) 3 units, Spr (LaFramboise) M 1:15-3:05 and by arrangement alternate years, not given 1995-96

234. Career and Personal Counseling in Culturally Diverse Settings — (Same as Psychology 237.) Methods of integrating career and personal counsel-
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 (Krumboltz, Thoresen, LaFramboise) by arrangement

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 (Krumboltz, Thoresen, LaFramboise) by arrangement

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, Aut (Padilla) MW 1:15-3:05

240. Adolescence: Health and Special Needs — Physiological and psychological problems of adolescence emphasizing health related issues including nutrition and substance abuse, adolescent development, and mainstreaming issues for secondary educators. Meets teacher credential requirements. Prerequisite: STEP student or consent of instructor. (STEP) 1-2 units, Aut (Staff) M 1:15-3:05

241. Children, Civil Rights, and Public Policy in the U.S. — For graduate students. See 141. 5 units, Spr (Steyer) WThF 11-12:30

242. First-Year Proseminar in Language, Literacy, and Culture — For master's and first-year doctoral students in LLC program. 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 (Padilla) MW 11:1-1:05 Spr (Padilla) MW 3:15-5:05

243. Research in Writing and Writing Instruction: The Social, Cognitive, and Linguistic Dimensions of Written Language — (Same as English 397R.) Tradition and change in writing research, emphasizing theoretical and pedagogical implications. Topics: Formalist, cognitive, and social-contextual approaches; writing and learning; writing/reading connections; writing/speaking connections; the composing process; writing pedagogy; individual research projects. (LLC, CTE) 4 units, Spr (Sperling) TTh 2:15-4:05 alternate years, not given 1995-96

245X. Promoting Sexual Responsibility in the Era of AIDS — For graduate students. See 145X. Enrollment limited to SUSE graduate students, STEP students, and advanced undergraduates. (PSE) 5 units, Spr (Diaz) Th 4:15-6:05

246A,B,C,D. Secondary Teaching Practicum — 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) W 1:30-3:15 and by arrangement

246B. 1-13 units, Aut (Carter) W 7-9 p.m. and by arrangement

246C. 1-13 units, Win (Carter) W 7-9 p.m. and by arrangement

246D. 1-13 units, Spr (Carter) W 7-9 p.m. and by arrangement

247. Moral Education — Philosophical issues in moral theory and moral education, including consideration of the Kohlberg-Gilligan debate and contemporary issues on values and religious education. (SSE) 4 units, Win (Nyberg) MW 1:15-3:05

248. Theory and Issues in Writing and Literacy — (Same as English 397R.) 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, Win (Sperling) TTh 2:15-4:05

249. Theory and Issues in the Study of Bilingualism — For graduate students. See 149. 4 units, Aut (Valdes) Th 3:15-6:05

250B. Statistical Analysis in Educational Research: Regression Analysis — Regression and categorical models are among the most 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: Statistics 60. (All Areas) 4 units (Olkin) not given 1994-95

253. Health Psychology Education Proseminar—Primarily for students in Health Psychology Education program. Contemporary topics in promoting health and preventing disease with a focus on intervention and treatment. Areas include cardiovascular diseases, various cancers, physical activity and fitness, sleep disorders, AIDS prevention, nutrition, eating disorders and overweight and issues of optimal health, well being (quality of life), and spiritual relationships to health. Fieldwork. May be repeated for credit. Prerequisite: consent of instructor. (PSE)

2-4 units, Aut (Thoresen, Hill) MW 10-11:50
Win, Spr (Thoresen, Hill) TTh 10-11:50

254X. Health Psychology Education: Field Work—Restricted to A.M. students. Application of knowledge and skills from course work and lab experience in supervised field setting (e.g., medical clinics, HMOs, elementary schools, university or corporate settings). Focuses on designing and implementive evaluating major intervention-related health project. May be repeated for credit. Prerequisite: consent of instructor. (PSE)

2 units, Aut, Win, Spr (Thoresen) T 10-11:50
Win (Thoresen) TTh 10-11:50

255. Human Abilities—(Same as Psychology 155.) 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) DR:9(4)

3 units, Win (Snow) MWF 10

255A. Human Abilities Research Topics—Discussion of individual student research topics in human abilities. Specifically planned, as an adjunct to 255 and Psychology 155, for doctoral students who have special interests that cannot be served by the large group instruction provided in those courses. Prerequisites: concurrent registration in 255 or Psychology 155, and consent of instructor. (PSE)

1-2 units, Win (Snow) by arrangement

256. Health Psychology Education: Supervised Practicum—For students in Health Psychology Education Program only. Supervised practice using problem-based learning approach to develop, conduct, and evaluate health promotion and disease prevention programs. Field work and group supervision seminar. May be repeated for credit. (PSE)

4 units, Aut, Win (Thoresen, Bridges)
TTh 1:15-4:05

Spr (Thoresen) TTh 1:15-4:05

257. Statistical Methods for Behavioral and Social Sciences—(Same as Psychology 152/252.) 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, and 191X; Statistics 190. (PSE)

6 units, Aut (Thomas, Brenner) MWF 11-12:30
plus section by arrangement

259X. Seminar in Higher Education—For students in MA/HE program only. Topics for students in the A.M. program 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. (APA)

3 units, Aut (Lyons) Th 9-10:50
Win, Spr (Lyons) F 9-10:50

260X. Investing in the Education of the Disadvantaged—The demography and educational needs of the disadvantaged and the investment strategies for improving their situation. Analysis of strategies include educational considerations, cost-benefit studies of interventions, and transformation of educational institutions serving the disadvantaged. Emphasis on the establishment of accelerated schools for all children including the process of change, cultural and organizational issues, and evaluation of results. Enrollment restricted to undergraduates, graduate students by consent of instructor. (APA/SSE)

5 units, Win (Levin) MW 1:15-3:05

262A, B, C. 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 or consent of instructor. (STEP)
262A. 3 units, Sum (Vosovic) TTh 1:15-3:05
262B. 2 units, Aut (Staff) M 4:15-6:05
262C. 1 unit, Spr (Staff) M 4:15-6:05

263A,B,C. 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 (Staff) TTh 1:15-3:05
263B. 2 units, Aut (Staff) W 4:15-6:05
263C. 1 unit, Spr (Staff) W 4:15-6:05

264A,B,C. 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 or consent of instructor. (STEP)

264A. 3 units, Sum (Azevedo) TTh 1:15-3:05
264B. 2 units, Aut (Azevedo) Th 4:15-6:05
264C. 1 unit, Spr (Azevedo) Th 4:15-6:05

265X. History of Higher Education in the U.S.—(Same as History 166/366.) See 165X.
3-5 units, Spr (Lyman) MW 9-10:50

267A,B,C. 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) TTh 1:15-3:05
267B. 2 units, Aut (Atkin) T 4:15-6:05
267C. 1 unit, Spr (Atkin) T 4:15-6:05

268A,B,C. 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 or consent of instructor. (STEP)

268A. 3 units, Sum (Cuban, Swenson) TTh 1:30-3:15
268B. 2 units, Aut (Cuban, Swenson) T 4:15-6:05
268C. 1 unit, Spr (Cuban) T 4:15-6:05

269. Foundations of Learning for Teaching—The psychology of instruction and the epistemology of school subjects as related to the planning and implementation of teaching, the analysis of curriculum and the evaluation of performance and understanding. Readings and activities are coordinated with internship and student teaching activities of participants. Prerequisite: STEP student or consent of instructor. (STEP)

4 units, Win (Shulman, Baugh) MW 3:15-5:05

270. African-American English in Educational Context—Examines linguistic and cultural conflicts that confront the majority of African-American students. Interdisciplinary research is reviewed with attention to cross-generational educational needs. Ethnographic studies of schools and their students are central as is the evolution of educational and linguistic research among African Americans. Prerequisite: graduate student, or consent of instructor. (LLC)
3 units (Baugh) given 1995-96

271X. Seminar in Higher Education: Curricular and Instructional Issues—How and why do university curricula change? How do professors teach these curricula? Why do they teach the way they do? To what degree have curricula and instruction changed over the last century? Case study approach addresses curriculum and instruction in higher education while building a bridge between literatures on curricular and instructional change between two levels of schooling. (APA, CTE)
3-4 units (Cuban) given 1995-96

272X. Economics to Gender, Education, and Work—Introduces economic theories and feminist perspectives on the relationship between gender and work, emphasizing the applicability of these theories to the experience of women in developing countries. Comparative and historical research and case studies on the determinants of gender differences in educational, occupational, and earnings opportunities in industrialized countries. The effects of public policies concerning women’s economic and family roles on the position of women in the labor market.
4 units, Aut (Nam) TTh 10-11:50

273. Education as a Social Science—Enrollment limited to and required of all first-year A.M. and Ph.D. students in SSE. Students meet with faculty of the area committee, are oriented to the range of intellectual and research strategies represented by the social science 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. (SSEP)
1 unit, Aut (Cohen) T 4:15-6:05

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.
4 units, Aut (Christopher) TTh 2:15-4:05

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: socializa-
tion, 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 out insights into the universal and cultural dimensions of education in industrial societies. (IDE, SSE)

4 units (Rohlen) not given 1994-95

276. 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. (SSE)

4 units (Duff) not given 1994-95

278. Introduction to Issues in Evaluation — Focusses on basic literature and major theoretical and practical issues facing the emerging evaluation profession. 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. (SSEP)

3 units, Spr (Phillips) TTh 8:30-9:50

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 (1) acquiring techniques of observation, interview, and interpretation of behavior in context, and soliciting and recording the “native” explanations of their own behavior; (2) developing an internally consistent conceptual structure that orients observation and elicitation productively; (3) being sensitized to one’s own culture and how it influences perception and interpretation of behavior. Selected 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. (SSEP)

5 units, Aut (G. & L. Spindler, McDemott) TTh 5:15-8:05 p.m.

281X. Mind, Body, and Spirit: Spiritual Health Through the Life Span — For graduate students. See 181X. (PSE)

3 units, Win (Thoresen) W 1:15-3:05 and by arrangement

282. Linguistics and the Teaching of English as a Foreign/Second Language — (Same as Linguistics 189/289.) Foundation in methods and techniques for teaching second or foreign languages from the perspective of modern linguistics and language acquisition theory. Focus is on the teaching of English, but the principles underlying the methods and techniques discussed are applicable to teaching any language. (LLC)

4-5 units, Win (Hubbard) MW 1:15-3:05

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 study of attitudes toward language. (LLC)

4 units (Padilla) not given 1994-95

284. English Language and Content Instruction Methodology — Primarily for STEP teachers. Prepares content-area (social studies, science, mathematics) teachers for CLAD certification. Focuses on the teaching of English as a second language and methods and techniques for developing the academic English-language skills of beginning, intermediate, and advanced non-English-background students. Subject-matter specialists emphasize language itself and contribute directly to the development of the English language competencies of their students. (LLC, STEP)

3 units, Aut (Staff) T 6-9 p.m.


4 units, Sum (Padilla) MW 4-5:45

287X. Culture and Learning — (Same as Anthropology 136.) 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. (SSE, STEP)

3 units, Sum (Baugh, McDemott) TTh 4-5:45

288. Social Diversity, the Constitution, and Educational Reform — Examines key normative issues facing educators. The relation of social diversity (race, ethnicity, gender, and class) to equality in schooling. Alternative conceptions of the purposes of education in reform movements. Prerequisite: STEP student or consent of instructor. (STEP)

1-3 units, Sum (Tyack) MF 1:30-3:15 and by arrangement
290. Leadership in Education: Research and Practice — A conception of leadership that includes the classroom, school, district office, and state capital. The role complexity of teachers through superintendents, past and present, and how that complexity permitted leadership to arise. Case studies and theory of the last century of schooling are introduced and discussed. (APA)
3-4 units, Win (Cuban) MW 10:30-12 alternate years, not given 1995-96

291. Methods of Teaching German — (Same as German Studies 302.) Overview of teaching methodologies and approaches, observation of classes and discussion of classroom practices, analysis and evaluation of materials. (LLC)
3 units, Aut (Petig)

292. Methods of Teaching Spanish — (Enroll in Spanish 301.) Analysis and discussion of second language theory on teaching and learning, classroom practices, and preparation of Spanish instructional materials. (LLC)
3-5 units, Spr (Haro) Th 11

293. Methodology of Teaching — (Same as French 260.) Approaches, methods, and procedures in relation to foreign language acquisition theory; teaching practice regularly observed in a demonstration class. (LLC)
3-5 units, Spr (Hester) T 1:15-3:05

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 1994-95

296. Substance Dependence: Assessment, Treatment, and Prevention — Open to graduate students in the social sciences. Survey of prevalence, etiology, and treatment of alcohol and drug-related disorders. Focuses on a developmental perspective and how substance abuse disorders manifest themselves in men and women at different ages from childhood through late adulthood. Discussion of various treatment approaches that have been beneficial such as AA, individual and group work, family treatment, and impatient vs. outpatient care. Required visit to relevant treatment programs during the quarter. (PSE)
3 units, Win (Thompson, Moffett) W 1:15-4:05

300X. Designing Research in Teacher Education — Open to current and former STEP supervisors and instructors, STEP cooperating teachers, and resident supervisors. Inquiry-based seminar design promotes competence in conceptualizing research questions about teacher education, collecting and analyzing data, and preparing results for professional presentation. Participants design research for issues in teacher education. (STEP)
2 units, Aut (McDermott, Lotan) T 4:15-6:05

301. Historiography of American Education — (Same as History 301.) Analysis of the literature of American education history, designed 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, Spr (Tyack) by arrangement alternate years, not given 1995-96

302X. The Role of Knowledge and Learning in Teaching — Focuses on current literature relevant to the structure of subject matter of instruction in schools, and to the cognitive processes involved as students try to learn material. Implications of the literature of role of the teacher. (APA)
3 units (Shulman, Phillips) not given 1994-95

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. Includes a small study using methods. (CTE)
4 units, Sum (Eisner) MW 9-10:50

304. The Philosophical and Educational Thought of John Dewey — (Same as Philosophy 304.) Analysis of important works of John Dewey. Readings vary each year. Emphasis may be on epistemology or social philosophy together with educational philosophy. (SSEP)
4 units (Noddings) not given 1994-95

5 units, Aut (Nam) MW 9-10:50

306B. Education and Political Change — Introductory analysis of the relations between education and politics 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. (IDE, SSE)
5 units (Staff) not given 1994-95
306C, Cultural Approaches to Education and Development — (Same as Anthropology 239.) Education in the context of specific cultural and social environments. Anthropological perspective of assumptions about education's role in the rise of industrialism, the establishment of the modern state, and the transformation of society by technology, ideology, and urbanism. Topics: cultural transmission and traditionalism, the local translation of modernization efforts, nationalism and culture, bureaucratic cultures, and educational ideology as a global phenomenon. (IDE, SSE) 3-5 units (McDermott) not given 1994-95

306D, World, Societal, and Educational Change: Comparative Perspectives — (Same as Sociology 332.) 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. (IDE, SSE) 5 units, Aut (Ramirez) MW 11-12:30 and by arrangement

308X, The Analysis of Teaching — Teaching is often thought of as an art or craft than as a science. In what sense might this be true? To what degree 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 with which to analyze teaching. Literature in criticism, aesthetics, and as qualitative evaluation secures conceptual tools for the analysis of teaching. (CTE) 4 units (Eisner) not given 1994-95

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. (SSEP) 4 units, Win (Cohen) MW 3:15-5:05

311X, Seminar for First-Year Doctoral Students 1 unit, Aut, Spr (Staff) Th 4:15-6:05 Win (Staff) Th 3:15-5:05

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. (SSE) 4 units, Aut (Cohen) MW 3:15-5:05

315, Cultural Transmission: Education in Cross-Cultural Perspectives — (Same as Anthropology 266.) 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 sensitzation. Attention to education in the U.S. and other complex societies, and in non-literate cultures. (SSE) 3-5 units, Win (G. & L. Spindler) Th 5:15-8:05 p.m.

317, Research on Teaching — Introduction to theory, methodology, and substantive findings of research on teaching and teacher education. (PSE) 4 units, Spr (Shulman) MW 1:15-3:05 alternate years, not given 1995-96

319, Theories of Self-Regulation and Behavior Change — Explores developmental, cognitive, and social theories of self-regulation, defined as the developing capacity to plan, guide, and monitor one's own behavior. Psychological theories of behavior change are examined, focusing on the processes by which behavioral intentions are formulated and enacted by individuals in challenging contexts and situations. Application of theory in clinical and education interventions. 3 units, Aut (Diaz) T 2:15-4:05

320X, 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. (APA) 3 units (Cohen) given 1995-96

321A,B, Qualitative 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, interviewing, 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. (SSE, IDE) 321A, 4-5 units, Win (Rohlen) TTh 4:15-6:05 321B, 4-5 units, Spr (McDermott) TTh 9-10:50
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)

4 units (Sperling) given 1995-96

323A. Federal and State Policy: Education and Children—The formulation and improvement of federal and state education and children policy. Key current policy issues and trends in past policies. (APA)

3 units, Spr (Kirst) MW 9-10:30 and by arrangement

331A,B. Administration and Policy Analysis Research Seminar—Workshop introduces research in administration and policy analysis. Students select their own research topics and pursue literature reviews and develop research questions and research strategies on those topics. Introduction to methods of developing topics, questions, and strategies through exposure to and discussion of research studies, and the use of the various faculty, library, and information resources that can be drawn upon for their research. Workshop meets once or twice a week during the entire year and culminates with student papers that develop research topics with critical reviews of the literature, appropriate research questions, and prospective research strategies for answering those questions. Prerequisite: first-year doctoral student in APA. (APA)

1 unit, Win, Spr (Bridges) by arrangement

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)

4 units (Valdes) not given 1994-95

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 (Kumboltz, Thoresen, LaFramboise) by arrangement

338B. 1-6 units, Win (Kumboltz, Thoresen, LaFramboise) by arrangement

338C. 1-6 units, Spr (Kumboltz, Thoresen, LaFramboise) by arrangement

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) by arrangement

341X. 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. Prepares STEP students for CLAD certification. (LLC, STEP)

3 units, Win (Baugh) T 4:15-6:05

343. Motivational Processes in Education—Acquaints students with basic processes and principles of human motivation through an examination of selected theoretical and empirical literature and the relevance of this work for motivating students to study, learn, develop their capabilities, and enhance their creativity within conventional school settings.

4 units, Spr (Staff) TTh 2:15-4:05

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 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). (APA)

4 units, Spr (Gumport) T 2:15-5:05 Th 1:15

347. Problems of Teacher Education—Students formulate researchable problems and promising methods for the study of teacher education. Compares teacher education with education in other
professions and other issues in the preservice and inservice education of teacher professionals. (CTE)
4 units (Shulman)
alternate years, given 1995-96

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 (Snow) Th 2:15-4:05

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 (Krumboltz, Diaz) Th 10-11:50 and by arrangement
350C. 3 units, Spr (Hakuta) Th 10-11:50 and by arrangement
350D. 1 unit, Aut, Win, Spr (Snow) by arrangement

351. Advanced Quantitative Methods in Behavioral Research — Advanced topics in applied statistics and psychometrics: observation of behavior, advanced computing methods, methods for causal inference. Prerequisites: statistical training at least at the level of Education 257. (PSE)
3 units, Spr (Rogosa) M 3:15-5:05

353A. Problems in Measurement: Item Response Theory — (Same as Psychology 249A.) 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, Aut (Haertel) MW 9-10:30
alternate years, not given 1995-96

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, parent involvement, support of school-based decisions by districts. (APA)
3 units (Levin) not given 1994-95

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 are considered, but emphasizes trends and issues in contemporary American research and policy. Seminars offer an opportunity to develop and discuss dissertation plans, but is not limited to those students. (CTE)
359A. Assessment and Evaluation 2 units (Atkin, Rowe)
alternate years, given 1995-96
359B. Instruction 2 units (Rowe)
alternate years, given 1995-96
359C. Curriculum 2-3 units, Aut (Atkin, Rowe) M 3:15-5:05
alternate years, not given 1995-96
359D. Teacher Education 2 units, Spr (Rowe) M 5:15-7:05
alternate years, not given 1995-96

368. Student Affairs, Administration Practices, and Issues — Objectives: provide an overview of college student services to ask what they do, how they are organized, why they are provided, and to explore current trends and issues; identify and analyze policy and other issues that transcend particular services, but that are usually among the concerns of student affairs deans and their associates; and to become familiar with some of the literature about college students and student affairs work. (APA)
4 units, Aut (Lyons) F 9-11:50

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. (APA)
4 units (Bridges)
alternate years, given 1995-96

373. Education as a Social Science — Enrollment limited to and required of all first-year Ph.D. students in SSEP. 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. (SSEP)
1 unit, Aut (Cohen) T 4:15-6:05

375X. Organizational Development: Theory and Practice — (Same as Business 375.) Designed to develop familiarity with theory and practice of
planned organizational change through case analyses, role plays, simulations, etc. (APA)
4 units (Staff) not given 1994-95

376. Education and Theories of the State—Explores 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 are discussed. (IDE, SSE)
5 units (Carnoy)
alternate years, given 1995-96

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. (APA)
5 units total (Wald) not given 1994-95

380. Supervised Internship
any quarter (Staff) by arrangement

384X. Advanced Topics in Higher Education—Preference given to higher education graduate students. 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 socialization, management of organizational decline, leadership and innovation, authority and power, diversity and equity, interactions with government and industry. Prerequisites: 346 and consent of instructor. (APA)
3-5 units (Gumport) given 1995-96

387A, B, C. Workshop: Comparative Systems—(Same as Sociology 311A, B, C.) Analysis of quantitative and longitudinal data on national educational systems and political structures. Prerequisite: consent of instructor. (IDE)
387A. 2-5 units, Aut (Ramirez, Meyer)
by arrangement
387B. 2-5 units, Win (Ramirez, Meyer)
by arrangement
387C. 2-5 units, Spr (Ramirez, Meyer)
by arrangement

388. Bilingual Education—Critical review of research addressing issues of policy and practice in programs for language minority students, particularly in the U.S. Topics: the history of policy and legislation in bilingual education, theories of second language learning and first language maintenance, research on the effectiveness of bilingual education, and comparative experiences in other societal settings. Prepares STEP students for CLAD certification (LLC, STEP)
3 units, Win (Hakuta) T 6-9 p.m.

390X. Advanced Seminar in Bilingual Education—(LLC)
1-3 units, Aut, Win, Sr (Hakuta) Th 12-1

397. Controversies in Classroom Research—Seminar on improving understanding the principles that underlie rival strategies of research, in terms of the theories of knowledge they embody and the actual procedures they employ. New methods of education research in schools and classrooms using case studies, narrative reports, collaborative work involving professors and classroom teachers, and action research. (CTE)
1-3 units, Aut (Atkin) M 7-9 p.m.

406X. Topics in Comparative Educational Research—Variable topics 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., Bernstein, Jourdieu). (IDE)
2-3 units (Ramirez) given 1996-97

408. Research Workshop in International and Comparative Education—Limited to advanced doctoral students in SIDE and SSE. Research workshop for the review of key issues in the methodology and epistemology of social research in education, and research proposals and findings by students and faculty. Prerequisites: 306A, B, C, D or equivalent. (IDE, SSE)
2-5 units, Win (Ramirez) Th 11-12:50

410. Topics in Symbolic Systems in Education—For students in PSE, CTE, LLC. Topics in the interdisciplinary study of intelligence, information, meaning, and learning, emphasizing research relevant to educational practice. Research perspectives from anthropology, artificial intelligence, linguistics, philosophy, and psychology. (PSE)
1-3 units, Aut (Phillip) M 3:15-5:05
Win, Spr (Walker, Baugh)
M 3:15-5:05

414. Higher Education Research Seminar—Topics from current projects at the Stanford Institute for Higher Education Research with student opportunities to contribute to the work. Subject matter: conceptual and quantitative models for college and university decision-making and productivity, faculty roles and incentives, applications of information technology, and institutional restructuring. Discussions include theory development, quantitative and qualitative research methods, and implications for management and policy-making. Prerequisite: intermediate or advanced doctoral student, or consent of instructor. (APA)
4 units, Aut (Massy) Fl:15-4:05
415. Seminar in Educational Psychology — Topical seminar for advanced students. Prerequisite: consent of instructor. (PSE)
not given 1994-95

416. Seminar on Aptitude — Limited to doctoral students in education and psychology. Study of individual differences in learning, cognitive, connotative, and affective processes related to education. Design and evaluation of instruction with respect to individual differences. Prerequisites: 255 or equivalent, and consent of instructor. (PSE)
3 units, Spr (Snow) TTh 2:15-4:05 alternate years, not given 1995-96

418X. 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 also acquire methodological 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 dissertations. Prerequisites: 346 and consent of instructor. (APA, SSEP)
3-5 units (Gumport) given 1995-96

420A,B. Advanced Seminar in Philosophy of Education — Seminar on particular issues during designated quarters. Enrollment limited; sign up with instructor prior to beginning of quarter. (SSEP)
1-3 units, Win (Noddings) by arrangement

421. Internship in Educational Administration — Field experience for students in the educational administration program. Supervised by staff; project centered. (APA)
1-3 units (Staff) not given 1994-95

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 degree of self-directed learning by students under the guidance of professors and practicing principals. (APA)
422A. 6 units, Sum (Bridges, Hill) TTh 1:15-4:05
422B,C. 6 units, Sum (Bridges, Hill) MW 1:15-4:05

423A. Introduction to Research Design: Educational Administration and Policy Analysis — Preference will be given 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. (APA)
3-5 units, Win (Staff) W 11-1:05

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 (Krumholtz, LaFromboise, Thoresen) T 4:15-6:05, biweekly

444X. Research in Progress: Teachers’ Education — Required of first- and second-year doctoral students in Curriculum and Teacher Education. 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) W 12-12:50

451. Research in Mathematical Education — Overview of the major problems, controversies, and findings in current research in mathematics education. (PSE)
2-4 units (Greeno) not given 1994-95

453. Doctoral Dissertation — (All Areas)
any quarter (Staff) by arrangement

466. Doctoral Seminar in Curriculum — Required of all doctoral students in C&TE. Provides an opportunity to become acquainted with research in the field, the research activities in which students are engaged, and the kinds of problems that they believe to be important in the field. Introduces research and scholarship related to the C&TE program at Stanford. All C&TE faculty participate, along with other Stanford faculty and outside speakers. Major problems in this field and ways these are addressed by current investigators. (CTE)
2-5 units, Win (Eisner) T 7-9:30 p.m.

470. Practicum — For advanced graduate students. (All Areas)
any quarter (Staff) by arrangement

470E. Practicum in Evaluation — Topics of current interest in the area of educational evaluation. Prerequisite: student member of the Evaluation Consortium. (All Areas)
any quarter (Staff) by arrangement

480. Directed Reading — For advanced graduate students. (All Areas)
any quarter (Staff) by arrangement

490. Directed Research — For advanced graduate students. (All Areas)
any quarter (Staff) by arrangement
493B. Statistical Methods for Meta-Analysis —
(Same as Health Research and Policy 206, Statistics 211.)
1-3 units (Olkin) not given 1994-95

SOCIAL SCIENCES AND EDUCATIONAL PRACTICE

100C. Issues and Methodologies in Education: An
Introduction for Elementary and Secondary Tutors
in Culturally Diverse Settings

100X. The State of Public Education in Urban Communities

105. American Education and Public Policy — (Same
as History 158B, Political Science 186K.)

110X. Urban Youth and Their Institutions: Research
and Practice

111. Introduction to Philosophy of Social Science —
(Same as Philosophy 61.)

141. Children, Civil Rights, and Public Policy in the
U.S. — (Same as 241.)

161. Introduction to Teaching and Learning in Asia

170. Gender and Education — (Same as Feminist Studies
130, Sociology 132.)

197. Education and the Status of Women: A Compar-
ative Perspective — (Same as Sociology 134.)

201. History of Education in the United States —
(Same as History 158.)

204. Introduction to the Philosophy of Education

206B. Project Workshop in International Develop-
ment Education

206X. Applied Research Methods in International
Development Education

207. Seminar: The Politics of International Coop-
eration in Education — (Same as Political Science 248.)

210. Problems in Sociology of Education — (Same as
Sociology 232/330.)

211X. Research Methods in Social Inquiry

215. American Education and Public Policy — (Same
as 105, History 158B, Political Science 168K.)

220A. The Social Sciences and Educational Analy-
sis: Introduction to the Economics of Education

220B. The Social Sciences and Educational Analy-
sis: Introduction to the Politics of Education —
(Same as Political Science 187.)

220C. Education and Society — (Same as Sociology
143.)

220D. History of School Reform: Origins, Policies,
and Outcomes

221. Issues in Policy Analysis — (Same as Public Policy
221.)

222. Resource Allocation in Education

223. Effective Schools: Research, Policy, and Prac-
tice

225X. Higher Education Economics, Finance, and
Management

231X. Campus Cultures

235X. Graduate Proseminar in Educational Policy

237X. Ethnographic Approaches to Evaluation
Policy Decision Making and Organizational Trans-
formation

241. Children, Civil Rights, and Public Policy in the
U.S. — (Same as 141.)

247. Moral Education

259X. Seminar in Higher Education

260X. Investing in the Education of the Disadvan-
taged

271X. Seminar in Higher Education: Curricular and
Instructional Issues

273. Education as a Social Science

273X. Women in Higher Education

278. Introduction to Issues in Evaluation

280. Ethnographic Approaches to Cultural Diver-
sity in Schooling — (Same as Anthropology 280.)

287X. Culture and Learning — (Same as Anthropol-
yogy 136.)

290. Leadership in Education Research and Practi-
cise

301. Historiography of American Education

304. The Philosophical and Educational Thought
of John Dewey — (Same as Philosophy 304.)

306A. Education and Economic Development

306D. World, Societal, and Educational Change:
Comparative Perspective — (Same as Sociology 332.)

310. Sociology of Education — (Same as Sociology 232/
330.)

312. Interaction Processes in Education: Design and
Evaluation — (Same as Sociology 242B.)

315. Cultural Transmission: Education in Cross-
Cultural Perspective — (Same as Anthropology 266.)

320X. Instruction of Heterogenous Populations

323A. Federal and State Policy: Education and
Children

331A,B. Administration and Policy Analysis Re-
search Seminar

346. Research Seminar in Higher Education

368. Student Affairs: Administration, Practices, and
Issues

373. Education as a Social Science

387A,B,C. Workshop: Comparative Systems — (Same
as Sociology 311A,B,C.)

408. Research Workshop in International Develop-
ment Education

414. Topics in Higher Education Research

420A,B. Advanced Seminar in Philosophy of Edu-
cation

422A,B,C. Practicum for Principals

423A. Introduction to Research Design: Educational
Administration and Policy Analysis
### CURRICULUM AND TEACHER EDUCATION (CTE)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>208A,B,C</td>
<td>Introduction to Curriculum</td>
</tr>
<tr>
<td>209X</td>
<td>Communities of Learning: Recasting Relationships in the Classroom and School</td>
</tr>
<tr>
<td>213</td>
<td>Aesthetic Foundations of Education</td>
</tr>
<tr>
<td>216X</td>
<td>Survey of Educational Research Methods</td>
</tr>
<tr>
<td>223</td>
<td>Effective Schools: Research, Policy, and Practice</td>
</tr>
<tr>
<td>224</td>
<td>Information Technology in the Classroom</td>
</tr>
<tr>
<td>303</td>
<td>Qualitative Inquiry in Education</td>
</tr>
<tr>
<td>359</td>
<td>Research in Science and Mathematics Education</td>
</tr>
<tr>
<td>359C</td>
<td>Curriculum</td>
</tr>
<tr>
<td>359D</td>
<td>Teacher Education</td>
</tr>
<tr>
<td>397</td>
<td>Controversies in Classroom Research</td>
</tr>
<tr>
<td>466</td>
<td>Doctoral Seminar in Curriculum</td>
</tr>
</tbody>
</table>

### LANGUAGE, LITERACY, AND CULTURE (LLC)

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>102</td>
<td>Culture, Class, and Educational Opportunity</td>
</tr>
<tr>
<td>149</td>
<td>Theory and Issues in the Study of Bilingualism</td>
</tr>
<tr>
<td>216X</td>
<td>Survey of Educational Research Methods</td>
</tr>
<tr>
<td>228</td>
<td>Psychology of Literacy</td>
</tr>
<tr>
<td>242</td>
<td>First-Year Proseminar in Language, Literacy, and Culture</td>
</tr>
<tr>
<td>243</td>
<td>Research in Writing and Writing Instruction: The Social, Cognitive, and Linguistic Dimensions of Written Language</td>
</tr>
<tr>
<td>248</td>
<td>Theory and Issues in Writing and Literacy (Same as Linguistics 252)</td>
</tr>
<tr>
<td>249</td>
<td>Theory and Issues in the Study of Bilingualism</td>
</tr>
<tr>
<td>282</td>
<td>Linguistics and the Teaching of English as a Foreign/Second Language (Same as Linguistics 189/289)</td>
</tr>
<tr>
<td>284</td>
<td>English Language and Content Instruction Methodology</td>
</tr>
<tr>
<td>286</td>
<td>Second Language Acquisition</td>
</tr>
<tr>
<td>291</td>
<td>Methods of Teaching German (Same as German Studies 302)</td>
</tr>
<tr>
<td>292</td>
<td>Methods of Teaching Spanish (Same as Spanish 301)</td>
</tr>
<tr>
<td>293</td>
<td>Methods of Teaching French (Same as French 260)</td>
</tr>
<tr>
<td>341X</td>
<td>Educational Applications of Sociolinguistics (Same as Linguistics 258)</td>
</tr>
<tr>
<td>388</td>
<td>Bilingual Education</td>
</tr>
<tr>
<td>390X</td>
<td>Advanced Seminar in Bilingual Education</td>
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### PSYCHOLOGICAL STUDIES IN EDUCATION (PSE)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>144X</td>
<td>Understanding Research on Children and Schools</td>
</tr>
<tr>
<td>145X</td>
<td>Promoting Sexual Responsibility in the Era of AIDS</td>
</tr>
<tr>
<td>171X</td>
<td>Peer Health Education</td>
</tr>
<tr>
<td>181X</td>
<td>Mind, Body, and Spirit: Spiritual Health Through the Life</td>
</tr>
<tr>
<td>191X</td>
<td>Introduction to Educational Statistics in Research</td>
</tr>
<tr>
<td>233</td>
<td>Seminar in Multicultural Counseling (Same as Psychology 235)</td>
</tr>
<tr>
<td>234</td>
<td>Career and Personal Counseling in Culturally Diverse Settings (Same as Psychology 237)</td>
</tr>
<tr>
<td>238A</td>
<td>Orientation to Counseling Psychology</td>
</tr>
<tr>
<td>238B,C</td>
<td>Counseling and Health Psychology: Supervised Applications</td>
</tr>
<tr>
<td>239</td>
<td>Contemporary Social Issues in Child and Adolescent Development</td>
</tr>
<tr>
<td>245X</td>
<td>Promoting Sexual Responsibility in the Era of AIDS</td>
</tr>
<tr>
<td>253</td>
<td>Health Psychology Education Proseminar</td>
</tr>
<tr>
<td>254X</td>
<td>Health Psychology Education: Field Work</td>
</tr>
<tr>
<td>255</td>
<td>Human Abilities (Same as Psychology 155)</td>
</tr>
<tr>
<td>255A</td>
<td>Human Abilities Research Topics</td>
</tr>
<tr>
<td>256</td>
<td>Health Psychology Education: Supervised Practicum</td>
</tr>
<tr>
<td>257</td>
<td>Statistical Methods for Behavioral and Social Sciences (Same as Psychology 152/252)</td>
</tr>
<tr>
<td>281X</td>
<td>Mind, Body, and Spirit: Spiritual Health Through the Life Span</td>
</tr>
<tr>
<td>296</td>
<td>Substance Dependence: Assessment, Treatment, and Prevention</td>
</tr>
<tr>
<td>317</td>
<td>Psychological Research on Teaching</td>
</tr>
<tr>
<td>319</td>
<td>Theories of Self-Regulation and Behavior</td>
</tr>
<tr>
<td>338A,B,C</td>
<td>Practicum in Counseling and Health Psychology</td>
</tr>
<tr>
<td>339X</td>
<td>Family Therapy: A Systematic Approach to Assessment and Treatment</td>
</tr>
<tr>
<td>343</td>
<td>Motivational Processes in Education</td>
</tr>
<tr>
<td>350A</td>
<td>Psychological Studies in Education</td>
</tr>
<tr>
<td>350B,C,D</td>
<td>Research Practicum in Psychological Studies in Education</td>
</tr>
<tr>
<td>351</td>
<td>Advanced Quantitative Methods in Behavioral Research</td>
</tr>
<tr>
<td>410</td>
<td>Topics in Symbolic Systems in Education</td>
</tr>
<tr>
<td>416</td>
<td>Seminar on Aptitude</td>
</tr>
<tr>
<td>431</td>
<td>Doctoral Seminar: Counseling and Health Psychology</td>
</tr>
</tbody>
</table>

### STANFORD TEACHER EDUCATION PROGRAM (STEP)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>212X</td>
<td>Designing Groupwork for Heterogeneous Classrooms</td>
</tr>
<tr>
<td>224</td>
<td>Information Technology in the Classroom</td>
</tr>
<tr>
<td>240</td>
<td>Adolescence: Health and Special Needs</td>
</tr>
<tr>
<td>246A,B,C,D</td>
<td>Secondary Teaching and Multicultural Education Practicum</td>
</tr>
<tr>
<td>262A,B</td>
<td>Curriculum and Instruction in English</td>
</tr>
<tr>
<td>263A,B</td>
<td>Curriculum and Instruction in Mathematics</td>
</tr>
<tr>
<td>264A,B</td>
<td>Curriculum and Instruction in Foreign Languages</td>
</tr>
<tr>
<td>267A,B</td>
<td>Curriculum and Instruction in Science</td>
</tr>
</tbody>
</table>
268A,B. Curriculum and Instruction in Social Studies
269. Foundations of Learning for Teaching
288. Social Diversity, the Constitution, and Educational Reform
300X. Designing Research in Teacher Education
444X. Research in Progress: Teachers' Education

DIRECTED READING AND RESEARCH, DISSERTATION, AND PRACTICA
(ALL AREA COURSES)

103X. Multi-Media Production Skills
173X. Peace Studies — (Same as History 154; Political Science 133; Sociology 108; Psychology 142; Science, Technology, and Society 143.)
180. Directed Reading in Education — Master's degree students.
190. Directed Research in Education — Master's degree students.
199. Undergraduate Honors Seminar
199A,B,C. Undergraduate Honors Seminar
250C. Statistical Analysis in Education Research: Multivariate Analysis
311X. Seminar for First-Year Doctoral Students
380. Supervised Internship
453. Doctoral Dissertation
470. Practicum — For advanced graduate students. Not for STEP students.
470E. Practicum in Evaluation — For Evaluation Consortium members.
480. Directed Reading — For advanced graduate students.
490. Directed Research — For advanced graduate students.
493B. Advanced Topics in Statistical Methodology
Dean: James F. Gibbons
Senior Associate Deans: John C. Bravman (Student Affairs), Dwain N. Fullerton (External Relations), Ann R. Gaddy (Administration), James D. Plummer (Faculty Affairs)
Associate Dean: Noé P. Lozano (Minority and Affirmative Action Programs)
Assistant Deans: Rene Cortinaz (Human Resources), Anthony J. DiPaolo (SITN), Cheryll Hawthorne-Seearight (Undergraduate Minority Programs)

Faculty Teaching General Engineering Courses
Associate Professors: John C. Bravman, David L. Freyberg, Alice P. Gast, Bruce B. Lusignan, Reginald E. Mitchell, Stephen Rock, Sheri D. Sheppard
Assistant Professor: Jonathan How
Lecturer: David Lougee
Visiting Associate Professor: Sultan A. Bhimjee

School of Engineering Advisory Committee on Engineering in Biology and Medicine: Charles R. Steele (Mechanical Engineering), Chair; Dennis Carter (Mechanical Engineering), I-Dee Chang (Aeronautics and Astronautics), Lambertus Hesselink (Aeronautics and Astronautics), Albert Macovski, Channing R. Robertson (Chemical Engineering), Gia Wiederhold (Computer Science, Medicine), Felix Zajac (Mechanical Engineering)

The School of Engineering offers four-year undergraduate programs leading to the degree of Bachelor of Science (B.S.), five-year 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 ten academic departments: Aeronautics and Astronautics, Chemical Engineering, Civil Engineering, Computer Science, Electrical Engineering, Engineering-Economic Systems, Industrial Engineering and Engineering Management, Materials Science and Engineering, Mechanical Engineering, and Operations Research. These departments and two interdisciplinary programs, Scientific Computing and Computational Mathematics, and Science, Technology, and Society 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 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, chemistry, and computer science 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 “Under-

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SCHOOL OF ENGINEERING
graduate Programs." In addition, students should work toward completing the equivalent of Stanford's foreign language requirement and as many of the University's distribution requirements 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. 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, 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 distribution, writing, and foreign language requirements outlined in the first pages of this bulletin. Most engineering programs automatically satisfy the University distribution requirements in Area 4 (Mathematical Sciences), Area 5 (Natural Sciences), and Area 6 (Technology and Applied Sciences). Depending on the program chosen, students will 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 the Senior Associate Dean for 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. 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 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 a Science, Technology, and Society or Individually Designed Major leading to the B.S. degree 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 Engineering, Electrical Engineering, Industrial Engineering, and Mechanical Engineering.

Accreditation is important in many areas of the engineering profession; students wishing more information about accreditation should consult their departmental office or the office of the Senior Associate Dean for Student Affairs in Terman 208.

POLICY ON SATISFACTORY/NO CREDIT GRADING AND MINIMUM LETTER GRADE INDICATOR

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 departmental and School of Engineering majors) must be taken for a letter grade.

For departmental majors, the minimum LGI (letter grade indicator) 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 LGI 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 Engineering, Electrical Engineering, Industrial Engineering and Engineering Management, Materials Science and Engineering, and Mechanical Engineering have the following components: 40-45 units of mathematics and science (see Notes 1 and 2); 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 72). 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 1994-1995 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, available from the office of the Associate Dean for Undergraduate Education.

CHEMICAL ENGINEERING

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
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<tbody>
<tr>
<td>Mathematics:</td>
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<tr>
<td>Math. 41, 42, 43. Calculus and Analytic Geometry</td>
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<tr>
<td>Math. 44. Calculus</td>
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<tr>
<td>Math. 130. Ordinary Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>Science:</td>
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</tr>
<tr>
<td>Phys. 51. Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>Phys. 53 Electricit and Magnetism</td>
<td>4</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>4</td>
</tr>
<tr>
<td>Chem. 36. Chemical Separations</td>
<td>3</td>
</tr>
<tr>
<td>Chem. 131. Organic Polyfunctional Compounds</td>
<td>3</td>
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<tr>
<td>Engineering Fundamentals:</td>
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<tr>
<td>Five courses from a list of six*</td>
<td>19-22</td>
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<tr>
<td>Technology in Society: 1 course</td>
<td>(see Note 4)</td>
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<td>Chemical Engineering Depth:</td>
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<tr>
<td>Chem. 130. Theory and Practice of Identification</td>
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<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>Engr. 20. Introduction to Chemical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 100. Chemical Process Modeling, Dynamics, and Control</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 110. Equilibrium Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 120. Separations 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>
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<tr>
<td>Chem. Engr. 150. Energy and Mass Transport</td>
<td>4</td>
</tr>
<tr>
<td>Chem. Engr. 180A,B. Chemical Engineering Laboratory</td>
<td>6</td>
</tr>
</tbody>
</table>
Mech. Engr. 33. Introductory Fluids Engineering
Restricted Elective†
Total .................................................. 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 Chem. Engr. 230, 231; Mat. Sci. & Engr. 151, 152; Elect. Engr. 111; Pet. Engr. 170, 251, 260. (Petitions for alternative courses will be considered.)

CIVIL ENGINEERING (CE)
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:
CE 102. Legal Context of Civil Engineering 3
CE 104. Engineering and Management of the Construction Process 3
CE 106. Water Resources 4
CE 108. Introduction to Structural and Geotechnical Engineering 4
CE 170. Environmental Science and Technology 3
CE 190. Geotechnical Engineering 4
Specialty courses in one of three options: General Civil Engineering**, Environmental and Water Studies††, or Structures and Construction***, plus other engineering electives 28-30
Total for Engineering Fundamentals plus Depth: 68

* Mathematics must include Math. 130 and either linear algebra/matrix theory or probability/statistics. Science must include Physics 51 or equivalent, Chem. 31, and Geol. and Envir. Sci. 1. For students in Environmental and Water Studies, Chem. 135 is strongly recommended.
† 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, and those in the General Civil Engineering option must take both Engr. 30 and 50.
** General Civil Engineering: CE 160N, 161, 173, 180A; CE 145 or 146; and CE 181 or 182.
*** Structures and Construction: CE 180A, three courses from CE 145, 146, 181, 182, and remaining specialty units from the following (Engr. 15; CE 145, 146, 176, 177, 180B, 181, 182).

COMPUTER SCIENCE (CS)
Mathematics: (25 units)
Math. 41, 42, 43. Calculus 15
Math. 103 or 113. Linear Algebra 3
CS 157. Logic and Automated Reasoning or Phil. 160A. First Order Logic 4
Math. Elective* 3
Science: (12 units)
Phys. 51. Mechanics 4
Phys. 53. Electricity and Magnetism 4
Other Science† 4
Engineering Basics: (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: (49 units)
CS 107. Programming Paradigms 5
CS 108. Object-Oriented System Design 4
CS 109A,B. Introduction to Computer Science 8
CS 143. Compilers 4
CS 154. Introduction to Automata and Complexity Theory 4
CS 161. Data Structures and Algorithms 4
CS 221. Introduction to Artificial Intelligence 3
CS 240A. Operating Systems 4
Elect. Engr. 182. Computer Organization 4
Computer Science Electives†† 6
Senior Project (CS 191 or CS 194)*** 3
* Any course of 3 or more units from the School of Engineering list (see Note 1) may be taken.
† Other science courses are to be taken from the School of Engineering list (see Note 2), plus Psych. 102, 106. Physics 61 and 63 or Physics 21 and 23 may be taken instead of Physics 51 and 53, as long as a total of 12 science units are taken.
** CS 201 also fulfills this requirement.
*** Independent study projects (for example, CS 191) require faculty sponsorship and must be approved by the adviser, faculty sponsor, and the CS program adviser (E. Roberts). A signed approval form, along with a brief description of the final project, should be filed at least two quarters before graduation. Further details can be found in the Handbook for Undergraduate Engineering Programs.

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:
EE 101, 102. Circuits 8
EE 105A. Controls 3
EE 111, 112, 113. Electronics 11
EE 121, 122. Digital and Analog Laboratory 6
EE 141. Electromagnetic Fundamentals 4
Engr. 102E. Writing for Electrical Engineers 1
Society courses†† 9
One course in Design† 3
Electrical Engineering electives 7
Total ........................................... 52
∗ Mathematics must include 130. These requirements are subject to change. The final requirements are published along with example programs in the School of Engineering Undergraduate Handbook during the summer.
† The design course may, but need not, be part of the specialty sequence. The following courses satisfy this requirement: EE 139, 183, 189A, 281; Engr. 206.
** Science is to include one course in both Physics and Chemistry. Science and math. units must total at least 45.
†† 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: CS 107; EE 182, 183 or 281, 218 or 271
Computer Software: Comp. Sci. 107, 108, 194
Controls: Engr. 105B and two from 206, 207A, 209
Electronics: EE 133, 139, 212, 214, 216
Fields and Waves: EE 142, 241, 242, 252
Signal Processing: EE 104, 133, 261, 264
*** Engineering Fundamentals should include Engr. 40 and 70X.

INDUSTRIAL ENGINEERING (IE)
Mathematics and Science: 45 units minimum* (See Notes 1 and 2)
Engineering Fundamentals:
five courses† (See Note 3)
Technology in Society: one course (See Note 4)
Engineering Depth:
Comp. Sci. 106B or 106X. Programming Abstractions 5
IE 100. Organizations: Theory and Management 4
IE 121. Statistics and Quality 4
IE 125. Manufacturing Systems Design 5
IE 133. Industrial Accounting 3
IE 180 or 183 or 186. Senior Project 4
IE 235. Introduction to Financial Decisions 4
IE 260. Analysis of Production Systems 4
Stat. 110. Statistical Methods 4
Total ........................................... 45
* Math. and Science courses should include Stat. 116 and Math. 103.
† Engineering Fundamentals courses must include Engr. 40, 60, and 70A.

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 3)
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 2
MSE 162. Materials Science Lab II 2
MSE 163. Materials Science Lab III 2
Materials Science Fundamentals* 24
Science and Engineering Options† 9
Total ........................................... 45
* MSE Fundamentals: 24 units from MSE 191, 192, 193, 194, 195, 196, 197, 198, 199.
† MSE Options: 9 units from one of the following options:
Physics (Phys. 110, 111, 120, 121, 122, 130, 131, 132, 170, 171, 172)
Chemistry (Chem. 151, 153, 171, 173, 175)
Chemical Engineering (Chem. Engr. 110, 130, 140, 150, 170; Engr. 20, 21; Mech. Engr. 33)
Electrical Engineering (Elect. Engr. 101, 102, 111, 112, 113, 141, 142; Engr. 40)
Mechanical Engineering (Engr. 14, 15, 21; Mech. Engr. 103, 111, 131A, 131B, 161)
Self-Defined Option (petition for a self-defined cohesive program, minimum of 9 units)

MECHANICAL ENGINEERING (ME)
Mathematics: 21 units minimum (See Note 1)
Science: 20 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 3
ME 113. Engineering Design 3
ME 131A. Heat Transfer 5
ME 131B. Fluid Mechanics 3
ME 131C. Thermodynamics 3
ME 132. Thermosciences Laboratory 3
or ME 130. Internal Combustion Engines 3
ME 161. Mechanical Vibrations 4
Total ........................................... 44
* Math. and science units combined must total at least 45.
† Engr. 15 and 30 are required.
PETROLEUM ENGINEERING

Petroleum Engineering is offered by the School of Earth Sciences. Consult the appropriate sections 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 minimum* | (See Note 1) |
| Science: 20 units minimum† | (See Note 2) |
| Engineering Fundamentals: | 
| five courses** | (See Note 3) |
| Technology in Society: one course | (See Note 4) |
| Engineering Depth: | 
| AA 100. Introduction to Aeronautics and Astronautics | 3 |
| AA 131. Experimentation in Aeronautics and Astronautics | 3 |
| AA 192. Vector and Tensor Analysis | 3 |
| AA 200A. Applied Aerodynamics | 3 |
| AA 210A. Fundamentals of Compressible Flow | 3 |
| Civ. Engr. 180B. Structural Analysis | 4 |
| Engr. 104. Dynamic Response | 3 |
| Mech. Engr. 33. Introduction to Fluids Engineering | 4 |
| Mech. Engr. 131A. Heat Transfer | 5 |
| Mech. Engr. 131B. Fluid Mechanics | 3 |
| Restricted Electives†† | 11 |
| Total | 45 |

* Must include Math. 44, 130.
† Must include Physics 51, 53.
** Must include Engr. 14, 30.

COMPUTER SYSTEMS ENGINEERING (CSE)

| Mathematics: (21 units) |
| Math. 41, 42, 43, 44. Calculus | 18 |
| Math. 103 or 113. Linear Algebra | 3 |
| Science: (12 units) |
| Phys. 51. Mechanics | 4 |
| Phys. 53. Electricity and Magnetism | 4 |
| Phys. 55. Light and Heat | 4 |
| Basic Engineering: (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 System Design | 4 |
| Comp. Sci. 109A,B. Introduction to Computer Science | 8 |
| Comp. Sci. 143. Compilers | 4 |
| or Comp. Sci. 240A. Operating Systems | 4 |
| Elect. Engr. 101. Circuits | 4 |
| Elect. Engr. 111, 112. Electronics | 8 |
| Elect. Engr. 121. Digital 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 (CS 191 or 194)** | 3 |
| Total | 101-103 |

* Comp. Sci. 201 also fulfills this requirement.
† A list of approved electives is reviewed annually. Refer to the Handbook for Undergraduate Engineering Programs for the current list.
** Independent study projects (for example, Comp. Sci. 191) require faculty sponsorship and must be approved in advance by the adviser, faculty sponsor, and the CSE program advisers (K. Olukotun or E. Roberts). A signed approval form, along with a brief description of the final project, should be filed at least two quarters before graduation. Further details can be found in the Handbook for Undergraduate Engineering Programs.

PRODUCT DESIGN

| Mathematics: 21 units minimum | (See Note 1) |
| Science: 20 units minimum* | (See Note 2) |
| Technical Electives: 15 units minimum† | 
| Technology in Society: one course | (See Note 4) |
| Engineering Depth: | 
| Art 60. Basic Design | 3 |
| Art 160. Design I | 3 |
| Art Studio Elective | 3 |
| Art Studio Elective | 3 |
| Mech. Engr. 103. Manufacturing Technology | 4 |
| Mech. Engr. 111. Stress, Strain, and Strength | 3 |
| Mech. Engr. 112. Mechanical Systems | 3 |
| Mech. Engr. 115A. Human Values in Design | 3 |
| Mech. Engr. 115B. Concept Presentation | 3 |
| Mech. Engr. 115C. Engineering Problems | 1 |
INDIVIDUALLY DESIGNED MAJORS (IDMs)

IDMs are intended for undergraduates interested in pursuing engineering programs that fall outside the purview of departmental 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), 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 adviser, 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 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 nonengineer.

The requirement is met by taking five courses from the following list:

- Engr. 20. Introduction to Chemical Engineering
- Engr. 30. Engineering Thermodynamics
- Engr. 40. Electronics
- Engr. 50. Introductory Science of Materials
- Engr. 60. Engineering Economics
  or Engr. 62. Introduction to Operations Research 1
- Engr. 70A or 70X. Introduction to Software Engineering

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.

PROGRAMS IN MANUFACTURING

Programs in manufacturing are available at the undergraduate, M.S., and Ph.D. levels. The undergraduate program of the Department of Industrial Engineering and Engineering Management provides 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. More information is included in the "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 Graduate Degrees Support 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 Coterminal 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 departmental 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 Tuteored 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 415-725-3000, fax 415-725-2868, write
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
Acoustics
Aerodynamics
Aerelasticity
Aerophysics and Experimental Space Science
Aerospace Structures
Aerospace Systems Synthesis and Design
Analytical and Experimental Methods in Solid and Fluid Mechanics
Composite Materials
Computational Fluid Dynamics
Flight Mechanics
Gaskinetics
Guidance and Control
Hypersonic and Physical Gas Dynamics
Modern Optical Diagnostics in Fluids
Navigation Systems
Propulsion
Robotics
Satellite Engineering
Structural Analysis and Design
Waves and Vibrations

CHEMICAL ENGINEERING
Applied Statistical Mechanics
Biocatalysis
Biochemical Engineering and Biophysics
Equilibrium and Transport Properties of Colloidal Dispersions
Hydrodynamic Stability
Kinetics and Catalysis
Newtonian and Non-Newtonian Fluid Mechanics
Polymer Physics
Rheo-Optics of Polymeric Liquids and Colloidal Suspensions
Surface and Interface Science

CIVIL ENGINEERING
Construction Engineering and Management
Environmental and Water Studies
Environmental Engineering and Science
Environmental Fluid Mechanics and Hydrology
Structural Engineering and Geomechanics
Geomechanics
Structural Engineering

COMPUTER SCIENCE
Analysis of Algorithms
Artificial Intelligence
Asynchronous Systems
Automated Deduction
Autonomous Agents
Combinatorial Mathematics
Complexity Theory
Computational Geometry
Computer Architecture
Computer Graphics
Database Systems
Design Automation
Distributed and Parallel Computation
Human-Computer Interaction
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 Languages and Operating Systems
Control and Systems Engineering
Communication Systems
Electronic Circuits
Electronic Devices and Technology
Fields, Waves, and Radioscience
Lasers and Quantum Electronics
Network Systems
Optics and Imaging
Signal Processing
Solid State Materials and Devices
VLSI Design
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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
Business Systems
Decision Analysis
Economic Analysis
Energy Modeling Analysis and Policy
Information Policy
Intelligent Systems
Mathematical Systems Analysis
Social Analysis

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
Computational Materials Science
Electrical and Optical Behavior of Solids
Electron Microscopy
Fracture
Imperfections in Crystals
Kinetics
Magnetic Behavior of Solids
Magnetic Storage Materials
Phase Transformations
Physical Ceramics
Physical Metallurgy
Solid State Chemistry
Structural Analysis
Thermodynamics
Thin Films
X-ray Diffraction

MECHANICAL ENGINEERING
Biomechanics
Combustion
Composites, Fracture of Solids
Continuum Mechanics
Controls
Dynamics
Energy Conversion
Engineering Design
Environmental Measurements
Experimental Mechanics
Fluid Mechanics
Heat Transfer
High Temperature Gasdynamics
Kinematics
Manufacturing Systems Engineering
Optimization
Product Design
Robotics
Thermodynamics
Transport Processes
Turbulence

OPERATIONS RESEARCH
Applied Probability
Combinatorial Optimization
Dynamic Programming
Energy and Economic Modeling
Equilibrium Programming
Integer Programming
Inventory Theory
Linear, Nonlinear Programming
Mathematical Programming
Networks
Nonlinear Equations
Queuing Theory
Reliability Theory
Simulation Methodology

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. Although
MAJOR OF THEIR RESEARCH INTERESTS, IS AVAILABLE FROM 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: Biomedical Engineering is offered. Details on this program and subsequent Ph.D. studies can be obtained from the 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, orthopaedic 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. Most 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 Department of Industrial Engineering and Engineering Management (IE-EM) and as joint programs by IE-EM and Mechanical Engineering. The graduate program in Computer-Aided Civil Engineering (CE) includes an option for manufacturing/construction automation. The CE program in Construction 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 engineering. For more information on the FPM program, contact Stanford Integrated Manufacturing Association (SIMA). Inquiries by email may be addressed to sima@sierra.stanford.edu.

GRADUATE PROGRAMS

MASTER OF SCIENCE

The M.S. degree is conferred on graduate students in engineering according to the University regulations stated in the "Advanced 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 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 "Advanced Degrees" section of this bulletin, and further information is found in departmental listings.

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. See the "Graduate Special Programs" section of this bulletin. University regulations for the Ph.D. are given in the "Advanced 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

The "Engineering" courses deal with subject areas within engineering that are, in their essential 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. Examples from engineering programs at Stanford. Lectures, problem sets, design exercises, writing assignments, field trips. DR:6(8) 3 units, Aut (Freyberg) M2:15-4:05, WF2:15.

2. Introduction to Engineering — Pertinent lectures from Engineering 1. Readings, paper. 2 units, Aut (Freyberg) M 2:15-4:05.

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. Emphasizes the modeling of physical systems and design of simple members and structures in two dimensions. Prerequisite: Physics 51. DR:6(8) 5 units, Aut (Staff) MTWThF 9 Win (Shah) MWF 9 Spr (Staff) MWF 9 problem sessions by arrangement.
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. Prerequisites: Math. 23 or 43, Physics 51. DR:6(8)
5 units, Aut (Rock) MWF 9
Spr (Ashley) MWF 10
problem sessions by arrangement

20. Introduction to Chemical Engineering — Overview of chemical engineering through discussion and engineering analysis of physical and chemical processes. Topics: overall staged separations, material and energy balance, concepts of rate processes, staged separations, 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 (Gast, Robertson) MWF 9

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: freshman calculus and physics. DR:6(8)
3 units, Aut (Mungal) MWF 10
Win (Mitchell) MWF 10

35. Automobile Technology — For non-scientists. An engineering description of today's automobile, how it works, and why it's designed the way it is. How the auto affects air pollution and aspects of engine design for improving exhaust emissions. Alternate power plants and fuels and their options for the long term. DR:6(8)
3 units, Aut (DeBra) MWF 10

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. Prerequisites: Physics 53 or equivalent, one course of calculus. DR:6(8)
5 units, Aut (Pease) MWF 11-12:15
Win (Khuri-Yakub) MWF 11-12:15
three-hour lab weekly by arrangement

3 units, Win (Bravman) MWF 11
Spr (Sinclair) MWF 11

60. Engineering Economy— 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. May be taken by freshmen, but recommended for second year or higher students. Prerequisite: Math. 41 or equivalent. Recommended: previous knowledge of elementary probability.
3 units, Aut (Staff) MWF 11, MWF 2:15
Win (Staff) MWF 11
Sum (Bhimjee) MTWTh 10

62. Introduction to Operations Research I — Theory and computation of optimal selection of decisions under certainty. Linear programming, network optimization models, dynamic programming, non-linear programming, and 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. DR:6(8)
4 units, Aut (Hillier) MWF 1-2:05
Spr (Veinott) MWF 1-2:05

70A. Programming Methodology — (Enroll in Computer Science 106A.)
70X. Programming Methodology and Abstractions (Accelerated) — (Enroll in Computer Science 106X.)

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)
M 7:30-10 p.m., Th 12:15
102E. Technical/Professional Writing for Electrical Engineers — Required of Electrical Engineering majors. Examine process of writing technical/ professional documents. Lectures, writing assignments, individual conferences. Pre- or corequisite: Electrical Engineering 121, or consent of instructor. 1 unit, Win, Spr (Loungee) W 4:15-5:05

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 (Loungee) TTh 11

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) T, W, or Th 7:30-10 p.m.


105A. 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. Pre-requisite: 104 or Electrical Engineering 102. 3 units, Aut (Powell) MWF 9 Win (Franklin) MWF 11

105B. State-Space Control Design — Design of linear feedback control systems using state space techniques. Design using pole placement and introduction to LQR. Design examples using classical and state space design methodology. Brief introduction to digital control for systems with fast sampling. Prerequisites: 105A, Math. 103. 3 units, Spr (Franklin) MWF 9

110. Statistical Issues in Manufacturing — Introduction to statistical ideas used in the design and control of modern manufacturing systems. Relationship to the strategic issues involved in global competitiveness. Topics: introduction to basic probability and statistics, Markov chains, queueing networks, simulation. Applications to production and scheduling, just-in-time inventory management, quality control, materials requirement planning. Software packages described and used. Prerequisite: Math. 43 or consent of the instructor. 3 units (Staff)


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. DR:9(S) 4-5 units, Aut (McGinn) TTh 2:15-4:05 optional section for extra unit

131. Ethical Issues in Engineering — (Same as Science, Technology, and Society 115.) Examination of ethical issues in contemporary engineering practice. Topics: 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-
random processes. Estimation based on weighted quadratic costs. Probability theory and Gauss-Markov
— Optimal Control and Estimation

Optimal Control and Estimation — 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)
by arrangement

PRIMARILY FOR GRADUATE STUDENTS

206. Control System Design and Simulation — Sequel to 105A. Analog computers are used for simulation and troubleshooting techniques. Design of differential actuators and sensors. Model instruction techniques. Teams design, build, and test a miniature control system. Emphasis on qualitative aspects of synthesis, generation of candidate design, and engineering trade-offs in system selection. Prerequisite: 105A.

4 units, Win (Rock) MWF 1:15
lab by arrangement

207A. Digital Control Design — The digital computer in feedback control. Sampling, z-transforms, digital filters, discretization of continuous compensation, discrete compensation design, quantization errors. Root-locus and frequency response design methods. Lab experiments on a personal computer with an interface to an analog system. Limited enrollment. Prerequisite: 105A.

3 units, Aut (How) TTh 11-12:15
Spr (Powell) TTh 11-12:15

207B. State-Space Digital Control Design — Design of digital control systems using the state-space approach. Pole placement and introduction to LQR design methods for the single-input single-output case. Least squares identification of an unknown system. Lab experiments on a personal computer with an interface to an analog system. Prerequisites: 207A: Math. 103 or Electrical Engineering 363 or Mechanical Engineering 200A.

3 units, Win (Powell) TTh 9:30-10:45


3 units, Spr (How) TTh 2:45-4


3 units, Spr (Rock) TTh 9:30-10:45


220A. 3 units, Aut (Hassell) TTh 9:30-10-45
220B. 3 units, Win (Kuske)
TTh 9:30-10:45
220C. 3 units, Spr (B. Zhong)
TTh 9:30-10:45

235A,B. Space Systems Engineering — 40-50 students, mostly from engineering and science, and from business, form a team to prepare a preliminary design study of a space system. Over the past five years 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. At the end of the second quarter, the class gives a verbal briefing to government and industry representatives and publishes a final report on the system. Prerequisite: senior or graduate standing on Engineering or Physics, or consent of instructor.

235A. 3 units, Win (Lusignan)
TTh 12:30-2:30 plus two hours by arrangement

235B. 3 units, Spr (Lusignan) TTh 12:30-2:30 plus two hours by arrangement

290. Graduate Environment of Support — Discussion by guest faculty, advanced graduate students, specialists from industry and government, and dean’s office. Topics and information related to adapting to the graduate study environment in terms of psychosocial, financial, and career issues. How these relate to diversity, affirmative action, and minority services, resources, policies, and procedures.

1 unit, Aut (Lozano, Mitchell, Mungal) M 5:15
297A, B, C. Ethics of Development in a Global Environment (EDGE)—(Same as Political Science 140A, 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 peacekeeping 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 “Wealth, Freedom, and Health”: development models, comparative national health, AIDS, control of wealth, India-China-Africa-S. America today. Speakers from Stanford and other institutions are experts who directly deal with world policy makers through research and advisory activities.

1-4 units, Aut, Win, Spr (Lusignan, Packenham, Gupta) lecture W 7:30-9:30 p.m. workshops by arrangement

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. 1 unit, Aut (Baganoff) T 4:15-5:30
Win (Moin) T 4:15-5:30
Spr (Lele) T 4:15-5:30

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) by arrangement

610. Manufacturing Systems Analysis—(Same as Business 610.) 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 rather than optimization or policy formulation.

4 units, Aut (Harrison) TTh 10-11:45

611. Understanding Manufacturing Processes—(Same as Business 611.) Provides a framework for understanding the technology of modern manufacturing processes, focusing on the key factors in developing an understanding of any manufacturing process. Underlying microscopic physics 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) and assembly processes (e.g., automobiles, computers). not given 1994-95

612. Manufacturing Organization—(Same as Business 612.) 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. Papers used in organizational theory and methods to understand behavior of and in manufacturing settings.

not given 1994-95

613. Design for Manufacturability—(Same as Business 613.) Structured methodologies of the DFM process, emphasizing the pivotal role of design in manufacturing effectiveness. 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 an independent study of the design and manufacture of a product currently in production leading to a new product definition offering improved competitive advantage. Second term is optional for the Future Professors of Manufacturing Program and addresses product development issues, emphasizing cost, quality, time, and engineering productivity. Topics: tolerance issues, six-sigma strategy, Taguchi Loss Function, robust design of product and process, design of experiments, proof testing, accelerated life testing, quality control, and the application of these concepts to an original design problem.

not given 1994-95

614. Manufacturing Performance Measurement—(Same as Business 614.) The processes by which data are collected, aggregated, interpreted, and acted upon in manufacturing enterprises. Fundamental issues of measurement theory and data analysis, financial and physical measurement in process control, product and process design, and external reporting contexts. Accounting issues: cost-volume-profit analysis, measuring the costs of congestion, quality, inventory, activity-based-costing, and tax considerations. Physical measurement topics: statistical process control, inspection, yield measurements, supply chain management, and environmental protection.

4 units, Win (Patell) TTh 3:20-5:05 by arrangement

615. Manufacturing Information and Coordination—(Same as Business 615.) Focuses on systems for sharing information, coordinating activities, and aligning different objectives in a manufacturing organization. Cross-functional coordination, goal
conflicts among agents, design of incentives, and resource allocation. Information systems that support coordination activities through a value delivery chain, including systems for order entry, master scheduling, requirements planning, product scheduling, and material flow control.

4 units, Spr (Whang) TTh 3:20-5:05

616. Proseminar in Manufacturing Education—
(Same as Business 616.) For students in the Future Professors of Manufacturing Program but open to others with consent of instructor. Through the presentation of a core module, followed by invited speakers from academia, industry, and government, discusses manufacturing topics not covered in traditional courses and which are needed to help prepare students for academic careers in manufacturing. Focus is a theme, e.g., environmental issues in manufacturing, the impact of rapid prototyping on manufacturing, manufacturing and the newly emerging economies, etc.

1 unit, Aut, Win, Spr (Reis) Th3:15

AERONAUTICS AND ASTRONAUTICS


Chair: George S. Springer

Associate Chair: J. David Powell


Associate Professors: Fu-Kuo Chang, Ilan Kroo, Stephen Rock

Assistant Professors: Jonathan How, Sanjiva Lele

Professor (Research): Per Enge, Steven W. Tsai

Courtesy Professors: Peter Bradshaw, Ronald K. Hanson, William C. Reynolds

Lecturers: Jack Franklin, Terry Holst, John Howe, Victor Lebacqz, Robert Warming

Consulting Professors: Donald Jacobs, Robert T. Jones, Harvard Lomax, Bernard Ross, Frederick H. Schmitz, Michael Tauber

Visiting Professors: Nicholas Rott, Robert Twiggs

* Recalled to active duty.

The Department of Aeronautics and Astronautics 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. Specific programs are available in the following areas:

Acoustics
Aerodynamics
Aeroelasticity
Aerophysics and Experimental Space Science
Aerospace Robotics
Aerospace Structures
Aerospace Systems Synthesis and Design
Analytical and Experimental Methods in Solid and Fluid Mechanics
Biomedical Mechanics
Composite Materials
Computational Mechanics
Computational Fluid Dynamics
Flight Mechanics
Gaskinetics
Guidance and Control
Hypersonic and Physical Gas Dynamics
Modern Optical Diagnostics in Fluid Mechanics
Propulsion
Waves and Vibrations

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 activities cover a number of advanced fields, with special emphasis on:

Aerodynamic Noise
Aeroelasticity
Aircraft Performance and Control
Applied Aerodynamics
Astrodynamics
Computational Fluid Dynamics
Control of Flexible Spacecraft
Control of Robots, including Space Robots
Conventional and Composite Structures/Materials Systems Optimization
Hypersonic Flight
Inertial Instruments
Navigation Systems
Nonequilibrium Flow
Optical Diagnostics in Fluid Dynamics
Optimal Control and Estimation
Spacecraft Design and Satellite Engineering
Shock Tube Studies of Vortex Interactions
Structural Aeroacoustics
Turbulence
Wave Propagation
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 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-leveling (0.1 arc sec); a low-level accelerometer evaluation chamber (10⁻⁴ to 10⁻⁹g); 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-bearing simulator for simulating the Stanford Drag-Free Satellite in an orbital dynamic environment to an altitude of 275 km.; an air-bearing simulator for tethersatellite simulation and for spinning-spacecraft attitude control to a few arc seconds, 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 Aerospace Robotics Laboratory (ARL) is developing advanced robot systems and control techniques applicable to industrial automation and space 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.

The ARL computing facilities include a dozen Sun-3 and Sun-4 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 ARL and the Computer Science Robotics Laboratory are partners in Stanford's Center for Automation and Manufacturing Science (CAMS). An ultraprecision machining laboratory is also part of the center.

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.

Research in hypervelocity fluid dynamics, aerophysics, and vortex interactions makes use of the Stanford high-pressure shock tube, a device that can produce gas motion at very high Mach numbers, but which can also be used as a transonic wind tunnel. The shock tube can also generate high-density, partially ionized plasmas under well-defined conditions. The associated instrumentation stresses modern optical diagnostics, especially holographic interferometry and high-speed spectroscopy.

Research in turbulent reacting flows is carried out in the Turbulence/Combustion Laboratory. This laboratory is centered around a variable pressure flow facility that permits studies of reacting flows under pressure conditions ranging from vacuum to 10 atmospheres. The apparatus is fully instrumented for laser diagnostics and fast local data acquisition. Current research includes studies of pulsed flames, development of particle tracking velocimetry, and visualization of the small-scale structure of turbulent jets.

Diagnoses of shock-wave phenomena emphasize modern optical methods, including resonant interferometry and holography. Other recently outfitted laboratories deal with hologra-
phy, optical data processing, tomography, and related problems involving Fourier optics. Several student instructional laboratories include facilities to study blunt-body flow with ballistic freeflight range equipment, flame temperature by line reversal, gyroscopic behavior, hot-wire application with a small low-turbulence air-flow apparatus, refractive index of gases and free-correction flow fields with interferometer equipment, shock-wave interaction by use of a shock tube, supersonic jets, supersonic flow fields with schlieren techniques, and vibration modes of a simulated wing. An experiment using laser holography is currently being designed. A continuous low-speed wind tunnel with an 18" x 18" working section and speeds to 200 feet per second is available for use in instructional laboratories and research. Cooperative programs between the department and the nearby NASA-Ames Research Center have permitted research students access to the extensive collection of fluid- and aerodynamic research facilities and advanced instrumentation at the NASA labs.

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 Experimental Fluid Dynamics group has developed an extensive capability in modern, state-of-the-art optical diagnostics for fluids studies, including several applications of laser techniques, Fourier optics, and interferometry. Special opportunities exist for students with overlapping interests in fluid dynamics and experimental physics.

Included among the facilities in the Durand Building are the Structures and Composites Laboratories 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 by autoclave curing and filament winding.

Service facilities in the building include a full machine shop, chemistry lab, and several conference rooms. Attached to the building is a modern classroom building equipped for televising lectures; it contains a lecture auditorium.

The department has over 100 computers in the Durand Building for use in the academic and research programs. Two clusters of PCs and Macintoshes are available for student use, and each research group is equipped with clusters of PCs, Macintoshes, or workstations.

There are other computer and terminal clusters throughout the campus. Terminals in these facilities provide for individual on-line, time-shared computation with the campus academic computer system. They are available to all students at no cost for their course work or unsponsored research.

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

Several faculty of the Department of Aeronautics and Astronautics (AA) participate in the Center for Space Science and Astrophysics (CSSA). Graduate students in the department can arrange a program that emphasizes astronautics, planetary and space sciences, and work with faculty associated with CSSA.

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), cosponsored by Stanford University and NASA-Ames Research Center, provides long-term cooperative research in conjunction with graduate education. Specializations encompassed by the institute include aerodynamics, fluid mechanics, flight dynamics, guidance, navigation, and systems analysis. The Stanford faculty and staff interact with the center staff, utilizing unique research facilities and experiencing leadership in long-term complex research, as well as resolving problems facing the aeronautics industry. The institute uses several specially designed laboratories: a blow-down facility to study the mixing and acoustic characteristics of jets issuing from different nozzle configurations at both subsonic and supersonic speeds, and an instrument lab.
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equipped with data acquisition and analysis equipment with modern minicomputers. A large anechoic chamber and several wind tunnels at NASA are actively used by the JIAA's faculty, staff, and students.

GENERAL INFORMATION

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 special events like Shuttle landings.

Further information about the facilities and programs of the Department of Aeronautics and Astronautics is available on request to the student services manager of the department.

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 should apply 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 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.

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 letter grade indicator (LGI) 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 "Advanced Degrees" section of this bulletin.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

An interdisciplinary program in Aeronautics and Astronautics leading to the B.S. degree in Engineering is available. 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. As a graduate-level department, Aeronautics and Astronautics has no other undergraduate component.

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 "Advanced 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 letter grade indicator (LGI) 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 LGI may delay expected degree conferral or result in refusal of
permission to take the qualifying examinations. Candidates with LGIs of 3.0 through 3.2 must request the permission of the Candidacy Committee to attempt the qualifying examinations.

AERONAUTICS AND ASTRONAUTICS (AA)
(45 Quarter Units)

The master's program in Aeronautics and Astronautics 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).

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 can count toward the M.S. degree only in Category D (Other Electives).

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: 131, Engr. 207A or B

2. Three courses, one each from three of the areas below:
   a) Fluids: 200A or 210A
   b) Structures: 240B, 256
   c) Guidance and Control: 271A, 279A
   d) One course selected from AA courses numbered 200 and above, excluding seminars and independent research.

Candidates who believe they have satisfied Category A requirements previously 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 — The fundamental mathematics prerequisites are calculus, ordinary differential equations, and vector analysis. 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 either (1) a minimum of 6 units in applied mathematics (for example, linear algebra, partial differential equations, complex variables, probability) or (2) a minimum of 6 units of technical electives that strongly emphasize applied mathematics. A list of courses approved for the mathematics requirement is available in the departmental student services office. Note that 25% 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.

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.
The University's basic requirements for the degree of Engineer are outlined in the "Advanced Degrees" section of this bulletin. The following are department requirements. The candidate's study program must fulfill 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 and the remainder usually selected from one of the following fields: (a) acoustics, (b) aeroelasticity, (c) aerophysics, (d) aerospace structures, (e) aerospace systems synthesis and design, (f) analytical and experimental methods in solid and fluid mechanics, (g) computational fluid mechanics, (h) flight mechanics, (i) gas kinetics, (j) guidance and control, (k) physical gas dynamics, (l) propulsion, and (m) waves and vibrations.

2. Six units of free electives.

Candidates for the degree of Engineer are expected to have a minimum letter grade indicator (LGI) of 3.0 for work in courses beyond those required for the master's degree.

**DOCTOR OF PHILOSOPHY**

The University's basic requirements for the Ph.D. degree are outlined in the "Advanced 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 second year of graduate 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 seminars). 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 graduate 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. 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.

Further information and application forms may be obtained from Graduate Admissions, the Registrar's Office.

COURSES

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.

3 units, Aut (Staff) TTh 11-12:15

104. Dynamic Response — (Enroll in Engineering 104.)

105A. Feedback Control Design — (Enroll in Engineering 105A.)

131. Experimentation in Aeronautics and Astronautics — Principles and importance of experimental methods used in aeronautics and astronautics; experimental design, performance, evaluation, and reporting of results. Requirements formally satisfied by lab experiments from the major areas (fluid dynamics, structural mechanics, guidance and control, and propulsion), or informally through an individual experimental project with a faculty supervisor and approved by the instructor.

3 units, Spr (Cantwell) lec. first week T 1:15-4:05; lab T or Th 1:15-4:05


3 units (Staff) not given 1994-95


3 units (Staff) not given 1994-95


3 units, Aut (Staff) TTh 9-10:15

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 aeronautics course. Recommended: 210A.

3 units, Win (Bradshaw) MW 10

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 standing in engineering, mathematics, sciences; or consent of instructor.

3 units (Lele) alternate years, given 1995-96

201B. Topics in Aeroacoustics — Acoustic equations and multipole representation; acoustic analogy approach to sound generation in compact flows; theories of Lighthill, Powell, and Mohring; acoustic radiation from moving surfaces; theories of Curl, FfowcsWilliams and Hawking; noise radiated by subsonic and supersonic jets; Lilley’s equation. Refraction of sound, geometrical acoustics. Prerequisite: consent of instructor.

3 units (Lele) alternate years, given 1995-96

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, Win (Jones) T 3:15

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, 3-surface, tailless designs), propulsion (prop-fans, 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, (Kroo) not given 1994-95


3 units, Win (Ashley) MWF 9

210A. Fundamentals of Compressible Flow — Emphasis on the development of the full three-dimensional 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. Prerequisites: 192 (may be taken concurrently) and Mechanical Engineering 131B or equivalents.

3 units, Aut (Baganoff) MWF 2:15

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, Win (Baganoff) MWF 1:15

211A. Physical Gas Dynamics — (Enroll in Mechanical Engineering 262A.)

212. Introductory Hypervelocity Aerophysics — Hypervelocity vehicle flight and energy exchange over a wide range of velocities and altitudes. Effects of internal excitation, dissociation, and ionization. Introduction to finite chemical rate processes, e.g., vibrational relaxation. Combined effects of viscosity, heat conductivity, and dissociation on surface heat transfer and drag. Black-body radiation and introduction to radiative vs. convective heating of hypervelocity vehicles. Field trip(s) to nearby aerospace facilities. Recommended: familiarity with the elementary concepts of compressible flow.

3 units, Win (Bershader) TTh 10:30-11:45

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. Different heat shielding methods and their effectiveness compared. Applications: the Space Shuttle, aerospace plane, Mars return missions, and atmospheric probe vehicles. Comprehension of fundamental physical principles is emphasized. Recommended: understanding of compressible, equilibrium, and real gas flows (210A and/or 212).

3 units, Spr (Tauber) TTh 8-9:15

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: a knowledge of linear algebra and Mechanical Engineering 200A, 200B, or equivalent approved by instructor.

3 units, Aut (Lomax) MWF 8

by direct approximate factorization and iterative Gauss-Seidel line relaxation. Application to the Euler equations in two and three dimensions. Computational problems are assigned. Prerequisite: 214A.

3 units, Win (MacCormack) MWF 11


3 units, Spr (MacCormack) MWF 11


3 units, Win (Warming) TTh 9-10:15 alternate years, not given 1995-96

216. Computational Fluid Dynamics Applications — Elements of computational fluid dynamics. Methods of solution for the nonlinear potential; Euler and Navier-Stokes equations emphasizing aerodynamic application. Topics: independent-variable transformation procedures, regeneration techniques, metric differencing algorithms, spacial differencing algorithms, and iteration schemes. Selected theoretical concepts are numerically tested with student generated computer programs. Prerequisite: 214A or consent of instructor.

3 units, not given 1994-95

218. Similitude in Engineering Mechanics — Application of similarity methods to the reduction and simplification of physical problems: similarity rules revealed by dimensional analysis and other groups of transformations; use of Lie groups in the generation of integrating factors for nonlinear ordinary differential equations, reduction of order; generation of similarity variables for partial differential equations, reduction of dimension; invariant groups of the heat equation, compressible and incompressible Navier-Stokes and Euler equations. Examples: boundary layers, heat conduction in nonlinear media, gasdynamic analogy for shallow water waves, motion of viscous vortices, similarity rules for turbulent shear flows local solutions of autonomous systems, evolution of 3-D tensor fields. Prerequisite: Mechanical Engineering 200B or Math, 131, or consent of instructor.

3 units, Spr (Cantwell) MWF 10


220. Optical Methods in Engineering Science — (Enroll in Electrical Engineering 207.)

221. Hypervelocity Flight — Flowfields about advanced aeromaneuvering vehicles at moderate to very high altitudes (around 100 km.). Navier-Stokes equations and macroscopic gradient vector applied to real gas flowfields including transport of mass, momentum, energy, chemical species, and surplus charge for dissociating and ionizing gases. Effects of chemical concentration, thermal, pressure, and forced diffusion; radiative transfer; and ablation. Consideration of chemical equilibrium, and chemical and thermodynamic nonequilibrium (for flight at very high altitude). Recommended: 212 or equivalent.

3 units (Howe) not given 1994-95

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, Spr (Baganoff) MWF 1:15

230. Basic Aerodynamics of Rotary Wing Aircraft and Power Generators — Recent advances in rotary wing technology as applied to helicopter and V/STOL aircraft, and the windmill. Fundamental aerodynamics of rotors, including general momentum theory, blade element theory, and an introduction to vortex theory. Aerodynamic and mission performance of the modern helicopter and other V/STOL aircraft using simple preliminary design methods.

3 units, Spr (Staff)

231. Dynamics and Control of Rotary Wing Aircraft — Known methods of controlling the modern helicopter and other V/STOL aircraft (tilt-rotor, tilting, jet) and questions of control uniqueness and redundancy. Emphasis on basic understanding of principles involved. Prerequisite: 230 or equivalent.

3 units, not given 1994-95
232. Topics in Rotary Wing Aircraft—Problems from current rotary wing research. Past topics: structural dynamics and aeroelastic problems of rotary blades, effects of airframe and propulsion system design on manual control of V/STOL aircraft, compressible aerodynamics and noise of rotary wing aircraft.

3 units, not given 1994-95

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) TTh 3:15-5:05

236B, C, D. Spacecraft Design—Continuation of 236A.

3 units, Spr, Sum, Aut (Twiggs) TTh 3:15-5:05

240A. Analysis of Structures—Elements of multidimensional elasticity theory. Boundary value problems; energy methods; analyses of solid and thin walled section beams, trusses, frames, rings, semimonocoque structures. Prerequisite: Engineering 14 or equivalent.

3 units, Aut (Springer) MWF 9


3 units, Win (F. Chang) MWF 8

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; methods of determining market demands and system mission performance requirements; techniques of 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 (take-off, climb, cruise, and landing). Direct and indirect operating costs prediction and interpretation. Aircraft functional systems (hydraulic, electrical, environmental control); avionics; importance and achievement of aircraft reliability and maintainability.

3 units, not given 1994-95


3 units, Aut (Parkinson) TTh 8-9:15


3 units, Aut (Ashley) MWF 9

245A. Introduction to Continuum Mechanics—(Enroll in Mechanical Engineering 238A.)

245B. Theory of Elasticity—(Enroll in Mechanical Engineering 238B.)

246A. Theory of Plates—(Enroll in Mechanical Engineering 241A.)

246B. Theory of Shells—(Enroll in Mechanical Engineering 241B.)

246C. Theory and Numerical Simulation of Shells—(Enroll in Mechanical Engineering 241C.)


3 units, Aut (F. Chang) TTh 1:15-2:30
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) M 2:15-4:05

253. Wave Propagation—(Enroll in Math. 274, Mechanical Engineering 236.)


3 units, Win (Springer) MWF 9


3 units, Spr (Ross) MWF 8

261A. Introduction to Turbulence—(Enroll in Mechanical Engineering 261A.)

268. Digital Image Processing—(Enroll in Electrical Engineering 268.)

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 reaction wheels or control moment gyros. For aircraft: natural longitudinal and lateral dynamic behavior and design of autopilots for flight path control, automatic landing, etc. Prerequisites: 200A or 208, 242, Engineering 105A.

3 units, Spr (Cannon) MW 11-12:15


3 units, not given 1994-95


3 units (DeBra) alternate years, given 1995-96


3 units (Parkinson) alternate years, given 1995-96

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, Spr (Enge, Parkinson) TTh 8-9:15 alternate years, not given 1995-96

273A. Digital Control Design—(Enroll in Engineering 207A.)

273B. State-Space Digital Control Design—(Enroll in Engineering 207B.)

273C. Optimal Control and Estimation—(Enroll in Engineering 207C.)

275. Fluid Power Control—(Enroll in Mechanical Engineering 229.)

276. Control System Design and Simulation—(Enroll in Engineering 206.)

277. Nonlinear Control—(Enroll in Engineering 209.)

278A. Optimal Control of Dynamic Systems—Optimization problems for dynamic systems with terminal and path constraints (calculus of varia-

3 units, Win (Staff) TTh 2:45-4

279A. 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 (DeBra) TTh 8-9:15

280. Rocket Propulsion Fundamentals — Introductory rocket dynamics, fundamentals of nozzle flow, use of performance parameters, thermochemical calculation of performance, heat transfer in rockets, basic design procedures, elements of electric propulsion, recent developments in space transportation systems. Prerequisite: thermodynamics or elementary gas dynamics.

3 units, Win (Cantwell) MWF 3:15

283. Aircraft Propulsion — Design and performance of airbreathing engines. Topics: introduction to 1-D gas dynamics; physical parameters and cycle analysis of ramjets, turbojets, turbofans and turbo-props; design of supersonic inlets and nozzles, compressor maps, component matching, fuel injection, ignition and combustion systems.

3 units, Aut (Cantwell) TTh 11-12:15

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.

1-5 units, any quarter (Staff)

291. 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. Students register in the quarter following 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. Student should see department Student Services Manager before enrolling.

1 unit, any quarter (Staff) by arrangement

293. Seminar in Spacecraft Application — For undergraduate and graduate students 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.

1 unit (Twiggs) not given 1994-95

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.

1 unit, Aut, Win, Spr (DeBra) W4:15

298. Seminar in Fluid Mechanics — (Enroll in Engineering 298.)


1-15 units, any quarter (Staff) by arrangement


1-15 units, any quarter (Staff) by arrangement

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.)

**CHEMICAL ENGINEERING**

Emeriti: (Professors) Andreas Acrivos, Michel Boudart
Chair: George M. Homsy
Professors: Curtis W. Frank, Gerald G. Fuller, George M. Homsy, Robert J. Madix, Channing R. Robertson
Associate Professor: Alice P. Gast
Assistant Professors: Chaitan Khosla, Eric S. G. Shaqfeh
Course Professors: Franklin M. Orr, Jr., John Ross
Senior Lecturers: James C. Schlatter, Robert H. Schwaar
Lecturer: Conrad Schadt
Consulting Professors: Wolfgang Knoll, John Rabolt, Jerome Swalen

* 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, polymer science, 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. It is recommended that the student discuss the prospective program with his or her adviser, especially if transferring from chemistry, physics, or another field in engineering. With some advanced planning, the student can usually arrange to attend one of the overseas campuses.

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 departmentally 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, Operations Research, 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 180A,B may be included as part of the 45-unit master's program. Departments 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 describing the results of this research must be submitted to and approved by the research adviser.

To ensure that an appropriately balanced program is taken by all M.S. candidates, the student's program must be approved by the departmentally appointed graduate adviser, and a program proposal for the master's degree should be worked out by the student and adviser at their first meeting of the academic year.

Minimum Grade Requirement — All courses intended to satisfy the 45-unit M.S. degree requirements must be taken for letter grades, if offered, with the minimum average letter grade indicator (LGI) of 3.0.

ENGINEER

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 39 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. After completing this series of courses and at least three quarters of residence (36 units or more of course or research work), the student is eligible to apply for the M.S. degree in Chemical Engineering. The remaining courses, to total 39 units, may be chosen from the basic sciences and 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 36-unit requirement for the M.S. but may not be applied toward the 39-unit course requirement for the Engineer 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 an average letter grade indicator (LGI) 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.

Qualification for the Ph.D. Program by Students Receiving the Degree of Engineer — After completing all the requirements for the Engineer degree, a student may request to be examined on the Engineer research work for the purpose of qualifying for the Ph.D. If the request is granted, the student's 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 months of study plus the requirements listed below.

Unit and Course Requirements — A minimum of 72 total units (including research) and 39 units of course work is required for the Ph.D. degree, including the following Chemical Engineering courses: 220, 221, 222, 230, 231, and either 232 or 233/234. After completing this series of courses and at least three quarters of residence (36 units or more of course or research work), the student is eligible to apply for the M.S. degree in Chemical Engineering. The remaining courses, to total 39 units, may be chosen from the basic sciences and 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 36-unit requirement for the M.S. but may not be applied toward the 39-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 an average letter grade indicator (LGI) 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 Graduate Degrees Support Section 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, equilibrium and transport properties of colloidal dispersions, hydrodynamic stability, kinetics and catalysis, Newtonian and non-Newtonian fluid mechanics, polymer adsorption, polymeric liquids and colloidal suspensions, rheo-optics of polymer science, science, 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 PRIMARILY FOR UNDERGRADUATES

20. Introduction to Chemical Engineering — (Enroll in Engineering 20.)
   3 units, Spr (Robertson, Frank) MWF 9

   3 units, Aut (Homsy) MWF 9

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) MWF 8

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 (Khosla) TTh 1:15-2:30

130. Kinetics and Reactor Design — Chemical kinetics, elementary steps, mechanisms, rate-limiting steps, and the 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) MWF 9

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 flow, 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) TTh 2:30-3:45
   discussion M 4

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 (Shaqfeh) TTh 10:30-11:45

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; estimation of capital expenditures and production costs; plant construction.
   3 units, Spr (Schwaar) TTh 3:15-5:05

PRIMARILY FOR GRADUATE STUDENTS

220. Applied Mathematics in Chemical Engineering — Mathematical problems in heat and mass transfer, fluid mechanics, and chemical reactor design. Applications of tensor calculus, solution of ordinary differential equations, perturbation techniques, stability of steady solutions,
phase plane methods: numerical methods for ordinary and partial differential equations, introduction to Fourier transformations to solve partial differential equations. Prerequisites: Math. 113, 130, 131, or equivalent.

3 units, Aut (Fuller) MW 1:15-2:30


3 units, Win (Shaqfeh) TTh 1-2:15

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 (Homsy) TTh 9-10:15

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 (Fuller) alternate years, given 1995-96


3 units, Spr (Fuller)


3 units, Aut (Gast) TTh 2:15-3:30

231. Molecular Thermodynamics — For graduate students in all engineering and science disciplines with an interest in spectroscopic studies of the gas and condensed phases. Diffraction. 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) MW 2:30-3:45

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, Win (Khosla) TTh 9-10:30

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 semi-crystalline polymers, polymer blends, liquid crystal polymers; rubber elasticity. Recommended: one introductory course in statistical thermodynamics.

3 units, Spr (Frank) MW 1-2:15

234. Polymer Chemistry — Emphasizes the statistical and kinetic aspects of polymer synthesis. Condensation, addition, anionic, cationic and heterogeneous polymerization processes, emphasizing molecular weight, stereoregularity, and composition. Molecular structure-property relationships used to establish design principles for polymer materials development. Introduction to techniques of polymer processing. Recommended: one course in introductory organic chemistry.

3 units (Frank) not given 1994-95

236. Colloid and Interface Science — In-depth coverage of colloidal and macromolecular systems; physics and chemistry of the solid/liquid interface.

3 units (Gast) not given 1994-95

237. Introduction to Biotechnology — (Same as Biological Sciences 237, Biophysics 237, Cell Biology 237, Chemistry 237.) Faculty from the Departments of Biological Sciences, Cell Biology, Chemical Engineering, Chemistry, Civil Engineering, Biochemistry, Genetics, Electrical Engineering, Molecular Pharmacology, Neurobiology, and Devel-
opmental 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 and engineering.
3 units, Spr (Staff)

270-279. 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 (Staff) by arrangement

270A,B,C. Biocatalysis
(Khosla)

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
(Homey)

278A,B,C. Statistical Mechanics of Dispersed Systems
(Gast)

279A,B,C. Transport Mechanics
(Shaqfet)

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) by arrangement

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.
1 unit, Aut, Win, Spr (Staff) by arrangement

CIVIL ENGINEERING

Emeriti: (Professors) Jack R. Benjamin, James Douglas, Rolf Eliassen, John W. Fondahl, Joseph B. Franzini, James M. Gere, Eugene L. Grant, George Herrmann, En Y. Hsu, Paul Kruger, Henry W. Parker, George A. Parks, Cedric W. Richards, Victor K. Thomson (Architecture)

Chair: Haresh C. Shah

Associate Chairs: Gilbert M. Masters, Clyde B. Tatum


Associate Professors: David L. Freyberg, Jeffrey R. Koseff, Kincho H. Law, Stephen G. Monismith (on leave Winter, Spring), Peter M. Pinsky

Assistant Professors: Ronaldo I. Borja, Martin Fischer, Lynn M. Hildeman, Mark Z. Jacobson, H. Allison Smith, Alfred M. Spormann

Professors (Research): C. Allin Cornell, Martin Reinhard, Paul M. Teicholz

Professor (Teaching): Gilbert M. Masters (Kyoto, Spring)

Consulting Professors: Mark N. Goltz


Consulting Associate Professors: E. Marco Aieta, Fouad M. Bendimerad, Angelos N. Findikakis, Michael W. London, Viorica Lopez-Avila, Martin W. McCann, Jr., Isao Sugiyai, Alvaro F. Umaña, Michael W. Walton

Consulting Assistant Professors: Mutasem El Fadel, Viorica Lopez-Avila, James Michael Williams, Yan Zang

The undergraduate curriculum provides a preprofessional program stressing the fundamentals common to many special fields of civil engineering. Free elective units plus the proper selection of courses for the requirements in mathematics, science, and engineering fundamentals permit students to obtain a broad civil engineering education, as well as a more specialized education 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 Engineering, 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 and at Stanford/USGS Institute for Research in Earthquake Engineering and Seismology. Research on control of hazardous substances is coordinated within the Western Region Hazardous Substance Research Center. Office space is provided for most of the graduate students who are research or teaching assistants.

In collaboration with the Department of Computer Science, the Center for Integrated Facilities Engineering (CIFE) employs advanced CAD database, artificial intelligence, and communications concepts to integrate the presently fragmented participants in the facility development process and to facilitate 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 offers opportunities to focus on construction engineering, construction management, environmental construction, and construction research. Subjects offered include estimating, productivity improvement, equipment and methods, planning and control techniques, managing human resources, construction administration, project and company organizations, concrete construction, building systems, construction finance and accounting, international construction, real estate development, labor relations, and computer applications. 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, petroleum engineering, or architecture who do not wish to satisfy the undergraduate prerequisite courses for the M.S. in Civil 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.

The Construction Program faculty and students are active participants in the Center for Integrated Facilities 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.

Students with backgrounds in all areas of engineering and science who are interested in applying their specialized abilities to solving en-
vironmental 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. The major areas of specialization in the program are in environmental engineering and science and in environmental fluid mechanics and hydrology.

The Environmental Engineering and Science Program emphasizes water quality, but also encompasses other environmental areas and the broader aspects of environmental concerns and planning activities. Course offerings include the chemical, biological, 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. Other departments offering relevant courses are listed at the conclusion of the Environmental Fluid Mechanics and Hydrology Program section below. 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. Courses from many other programs and departments both complement and supplement the Environmental Fluid Mechanics and Hydrology Program offerings. Some examples include Environmental Engineering and Science (chemical and microbiological processes), Mechanical Engineering (applied math, fluid mechanics, heat transfer, experimental methods), Geological and Environmental Sciences (hydrogeology, geostatistics), Computer Science (numerical methods), Petroleum Engineering (reservoir engineering, well-test analysis), and Statistics (probability and statistics).

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.

**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, 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. Research at the interface between earthquake engineering and the earth sciences is conducted at the Stanford/USGS Institute for Research in Earthquake Engineering and Seismology.

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 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 mechanics, mathematics, and computer science, and encompasses numerical structural and geotechnical analysis, including finite element analysis and boundary element methods. There is collaborative research in bioengineering 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.

**HONORS PROGRAM**

This program leads to a B.S. with Honors in Civil Engineering. It is designed to encourage highly qualified students to undertake a more intensive study of civil 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 Engineering (CE) 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 letter grade indicator (LGI) 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 CE 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 CE 199, Directed Reading and Special Studies in Civil Engineering, may be taken to support the research and writing (not to duplicate Engineering 102S). These units are beyond the normal civil 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 Engineering. Successful applicants will be 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 will be advised if the transfer is possible. If, after enrollment at Stanford, students wish to continue toward a degree beyond the one for which they were originally admitted, a written application must be made to the Department of Civil Engineering.

**MASTER OF SCIENCE**

The University requirements governing the M.S., the Engineer, and Ph.D. are described in the "Advanced Degrees" section of this bulletin.

Programs are available leading to the M.S. degree in Civil Engineering with the following
special field designation on the diploma: Construction Engineering and Management, Environmental Engineering and Science, Environmental Fluid Mechanics and Hydrology, Geomechanics, and Structural Engineering. Detailed statements of the requirements for all master’s degrees and the specific designation may be secured from the Department of Civil Engineering.

Students admitted to graduate study with a B.S. in Civil Engineering (or its equivalent) from an accredited curriculum can satisfy the requirements for the M.S. degree in Civil Engineering by completing a minimum of three quarters of full tuition registration and a minimum of 45 units of study beyond the B.S. At least 36 of the units must be taken at Stanford. A minimum 2.75 letter grade indicator (LGI) is required for candidates to be recommended for the M.S. degree. No thesis is required.

The program of study must be approved by the faculty of the department and should include at least 45 units of courses in engineering, mathematics, science, and related fields unless it can be shown that other work is pertinent to the student’s objectives.

Candidates for the M.S. in Civil Engineering who do not have a B.S. in Civil Engineering may, in addition to the above, be required to complete those undergraduate courses deemed important to their graduate programs. In such cases, more than three quarters of residence is usually required to obtain the degree.

ENGINEER

A student with an M.S. in Civil Engineering may satisfy the requirements of the degree of Engineer in Civil Engineering by completing, in residence, 45 or more units of work (3 quarters minimum) including an acceptable thesis (12 to 15 units) and maintaining a ‘B’ LGI average (3.0) or higher. The program of study must be approved by the member(s) of the faculty of the department.

This degree is recommended for those desiring additional graduate education, especially those planning a career in professional practice. The thesis normally should be started in the first quarter 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 “Advanced 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 in planning, design, and analysis. 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 the 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 departmental 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 Engineering (CE) must have a minor program adviser who is a regular CE 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 CE completed at Stanford University. The list of courses must form a coherent program and must be approved by the minor program adviser and the CE chair. An average LGI 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. Engineering 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, availability of research funds, and requisite staffing of current projects. Detailed information may be obtained by writing to the Department of Civil Engineering.

COURSES

UNDERGRADUATE

102. Legal Context of Civil Engineering — Introduction to U.S. legal system as it applies to civil engineering and construction. Fundamental concepts of contract and tort law, changes, claims, risk management, and environmental issues.

3 units, Win (London, Staff) F 2:15-5:05

104. Project Management in Engineering and Construction — Techniques for planning, organizing, and executing building, civil, and environmental engineering projects from conception to completion. Basic trade-offs for scope, quality, cost, and time. Time and cost planning for projects including scheduling and basic cost estimating. Managing facility projects, measuring and recording progress, optimizing work operations, and using project information systems.

3 units, Aut (Fischer) MWF 9

plus additional hours by arrangement


4 units, Win (Freyberg) MWF 11-12:05

108. Introduction to Structural and Geotechnical Engineering — 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. Prerequisite: Engineering 14.

4 units, Spr (Smith) TTH 10, W 2:15-4:05

140. Construction Surveying — Care and use of level and transit, construction layout, horizontal and vertical curves. Lab exercises in the field.

3 units, Spr (Williams, Parker) F 10, lab F 1-5

141. Design and Construction of Concrete Canoe for ASCE Competition — CAD, structural and hydrodynamic analysis, selection of materials and construction methods, construction and testing of canoe, participation in competition.

1 unit, Win (Fischer) by arrangement

145. Construction Equipment and Methods — Construction engineering fundamentals; equipment economics; selection and efficient application of equipment; analysis of production output and costs. Prerequisites: Engineering 14, 60, Physics 51.

3 units, Spr (Paulson) MWF 9

146. Building Systems — Basic design concepts, components and standard materials, and construction operations for major building systems. Topics: heating, ventilating and air conditioning (HVAC) systems, piping systems, and electrical systems. Student groups analyze actual building systems and prepare oral and written reports describing the design, materials, and construction for a selected system, and the results of redesign for a portion of the system.

4 units (Staff) given 1995-96

160N. 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 flows in specific engineering applications. Lab experiments/demonstrations complement lectures. Prerequisites: 106, Physics 51, Math. 23 or 43. Recommended: Engineering 30.

5 units, Aut (Monismith) MWF 10, M 2:15

plus two hours by arrangement
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: 106, 160N.

4 units, Spr (Koseff) MWF 9, M 1:15

plus two hours by arrangement

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; radiation 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. Prerequisite: 160N or equivalent, or consent of instructor.

3 units, Win (Jacobson) MWF 1:15

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. DR:6(8)

3 units, Aut (Masters) MWF 8

171. Environmental Planning Methods — For juniors and seniors. Use of microeconomics and mathematical optimization theory in design of environmental regulatory programs; tradeoff between equity and efficiency in designing regulations; techniques for predicting visual, noise, and traffic impacts in environmental impact assessments; introduction to risk assessment and geographic information systems. Prerequisites: 170, Math. 43. Recommended: Economics 1, 51Q.

3 units, Win (Ortolano) MW 3:15-4:30

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 optimal air quality management. Prerequisite: Math. 43.

3 units, Win (Hildemann) MWF 10


4 units, Spr (Leckie, McCarty, Roberts) MWF 10 section T 1:15-3:05

174. Ethical Issues in Civil Engineering — Ethical and values issues that arise in the practice of civil engineering. Analysis of value-laden components of civil engineering work (environmental impact studies, setting air pollution, water purification, and toxic waste disposal standards) and the location, design, and construction of structures (dams, bridges, hotels, sewage treatment and toxic waste disposal facilities, and chemical and power plants). Ethical issues arising from carrying out civil engineering work in foreign countries. Use of real-life case studies and guest practitioners.

3 units (McGinn)

alternate years, given 1995-96

175. Environmental and Natural Resource Economics — (Same as Economics 155, Earth Systems 112.) Analysis of economic sources of environmental problems in a marked 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; connections between population growth and the environment. Prerequisite: Economics 51.

5 units, Spr (Goulder)


3 units, Win (Masters) MWF 9

177. Building Energy Laboratory — Measurement of small-building heat losses, infiltration, indoor air quality, use of thermal mass, and energy efficient lighting. Performance measurements of solar thermal and photovoltaic energy systems. Prerequisite: concurrent or previous enrollment in 176.

2 units, Win (Masters) Th 9

three-hour lab weekly by arrangement

180A. Introduction to Structural Analysis — (Continuation of Engineering 14.) 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, plane strain, and principal stresses; analysis of inelastic and nonlinear beams. Prerequisites: 108, Engineering 14.

3 units, Aut (Pinsky) TTh 10-11:50
180. 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: 108A. 4 units, Win (Kiremidjian) TTh 9-10:50

181. Design of Steel Structures — Concepts of design of steel structures with load and resistance factor design (LRFDF) 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) TTh 2:15-4:05

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 (Krawinkler) given 1995-96

190. Geotechnical Engineering — Introduction to basic principles of soil mechanics. Soil classification, shear strength and stress-strain behavior of soils, consolidation theory, analysis and design of earth retaining structures, introduction to shallow and deep foundation design, slope stability. Lab projects. Prerequisite: Engineering 10A, 11, or 14. 4 units, Aut (Borja) MWF 11

197. Professional Development Seminar — Weekly presentations by practicing engineers on topics relevant to students planning to enter the civil engineering profession. Environmental, structural, construction, and development perspectives. 1 unit, Spr (Fischer) TTh 12:15-1:05

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) by arrangement

PRIMARILY FOR GRADUATE STUDENTS

203. Statistical Models in Structural Engineering — Applications of probability and statistical analysis to structural engineering, model construction from probability theory, descriptive statistics, recognition of variation including professional elements, models for reliability studies of civil engineering designs, and introduction to structural component reliability analysis. Prerequisites: graduate standing, Math. 43. 4 units, Aut (Staff) TTh 1:15-3:05

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) TTh 10-11:50

214. Symbolic Modeling in Engineering — Investigates 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 106 or equivalent. 4 units, Spr (Kuzn) T 12:15-2:15 Th 12:15-1:10

240. Productivity Improvement in Construction — Understanding, analyzing, designing, and improving work at the site. Data acquisition, analysis, simulation, modeling, and design. Emphasis on work methods development, productivity, and safety. 4 units, Aut (Paulson) TTh 9-10:50

241. Techniques of Project Planning and Control — Analytical techniques for estimating, planning, scheduling, and controlling the design and construction of projects. Planning and control systems, work breakdown structures, concepts of networking techniques including treatment of uncertainty, resource allocation and leveling, time/cost tradeoffs, financial management, and integration of CAD, estimating and scheduling. 4 units, Win (Fischer) TTh 10-11:50

242. Cases and Special Topics in Managing Construction — Case studies in application of techniques for managing individual construction projects and companies. Emphasis on the need for leadership skills through actual cases and field trips to local projects. Requires individual and group efforts. Prerequisites: 240, 241, 250, or consent of instructor. 3 units, Spr (Clough) TTh 9-10:50

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 and group projects build on construction knowledge and experience. Tutorials or field trips on selected Fridays. Prerequisite: Computer Science 106A or equivalent. 4 units, Win (Paulson) MWF 8-9:50

2 units, Aut (Tucker, Meyer) F 8-9:50

245. Advanced Construction Financial Issues and Claims — Continuation of 244. Emphasis is on advanced construction accounting and economic issues and the analysis and understanding of construction industry financial statements and financial disclosures (third party reporting). Construction claims and project cost overrun analysis and cost recovery methods related to labor, equipment, indirect, overhead, and profit claims. Schedule delay analysis in the context of claims.

2 units, Spr (Tucker, Meyer) F 8-9:50


4 units, Spr (Levitt) MW 10-11:50

248. Construction Financing in Real Estate and Land Development Problems — Priority given to graduate Construction Program students. The interrelationships between all of the variables that make up a successful real estate project. Emphasis is on financial aspects involved in land acquisition, land development, construction, permanent lending, and project management. Aspects of joint venturing including the control of functions and equity financing. Enrollment limited to 20. Prerequisites: 244 or equivalent, Engineering 60.

3 units, Spr (Medearis) MF 7:30-8:50 plus one hour by arrangement

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.

3 units, Spr (Clark, Walton) T 3:15-6:05

250. Management of Human Resources in Construction — Uses theoretical framework and group problem solving exercises to understand the behavior of people in the workplace, and to develop skills to manage them. Focuses on project-oriented organizations in the construction industry, but applicable to students interested in project-focused teams in other industries. Views behavior as learned, and organizations as systems that teach, in intended and unintended ways, behavior to their employees. Groups of 12 students solve one problem exercise per week outside of class, providing practice in running large meetings. Readings structured through queries; peer groups evaluate their members’ contributions.

4 units, Aut (Levitt) M 2:15-4:05 W 2:15 plus one hour by arrangement

253. Infrastructure Construction Methods — Analysis of problems in infrastructure construction techniques, methods, and equipment through lecture, case studies, and field trips.

3 units, Win (Clough) TTh 9

254. International Construction — Comparison and examination of technical, managerial, and economic factors related to construction engineering and management in the global marketplace. Topics address advanced technology and developing countries. Individual research paper required. Prerequisites: 240, 241, 250, or equivalent experience.

3 units, Spr (Fischer) M 1:15-3:05 W 1:15

255. Concrete Construction — Technical aspects of the methods and operations involved in concrete construction: concrete production; formwork; field operations; and special techniques. Actual cases and field trips.

3-4 units, Aut (Clough) TTh 9-10:50

257. Building Systems and Industrial Construction — Analyzes basic design concepts, components and standard materials, and construction operations for major building systems. Topics: heating, ventilating, and air conditioning (HVAC) systems; piping systems; and electrical systems. Student groups analyze actual building or process systems and prepare oral and written reports describing the design, materials, and construction for a selected system, and the results of a technical and managerial analysis of selected topics.

4 units (Staff) given 1995-96

258A,B,C. Donald R. Watson Seminar in Construction Engineering and Management — Weekly evening discussions of special topics with speakers from industry and government. Normally taken by construction graduate students each quarter for three quarters. Lecture builds on required construction graduate courses; credit registration restricted to students in the graduate construction program.

258A. 1 unit, Aut (Staff) T 4-6

258B. 1 unit, Win (Staff) T 4-6

258C. 1 unit, Spr (Staff) T 4-6
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) by arrangement
259B. 1-3 units, Win (Staff) by arrangement
259C. 1-3 units, Spr (Staff) by arrangement


4 units (Freyberg) given 1995-96


3 units (Kitanidis) not given 1994-95

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: 160N or equivalent, and some knowledge of vector calculus.

3 units, Aut (Koseff) MWF 1:15


3 units, Win (Koseff) MWF 11

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.

4 units, Spr (Staff) TTh 8:30-9:50
T 1:15-2:20


4 units, Spr (Jacobson) MWF 1:15-2:20

264. Climate Theory, Modeling, Applications, and Implications — (Enroll in Biology 217.) History of the co-evolution 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. Climactic predictability; implications of predictions and relevance to current controversies. Prerequisites: 163 or Biology core and math through differential equations, or consent of instructor.

3 units (Schneider) alternate years, given 1995-96

265. Sustainable Water Resources Development — Priority given to Environmental and Water Studies program graduate students. 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 for enhancing sustainability of future projects. Enrollment limited. Prerequisite: graduate standing or consent of instructor.

3 units, Win (Ortolano) Th 1:15-3:05

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 environmental impact assessment. Limited enrollment.
Prerequisite: 171 or graduate standing in the Environmental and Water Studies program.

4 units, Spr (Ortolano) TTh 3:15-4:30 plus three hours by arrangement


3 units, Win (Kitanidis) MWF 10


4 units, Win (Kitanidis) TTh 8:30-9:50

269. Water Resources Seminar—Problems in all branches of water resources, with talks by visitors, faculty, and students. Graduate students may register for 1 unit without letter grade.

1 unit, Spr (Koseff) M 12:15

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: 160N.

3 units, Aut (Roberts) MWF 8


3 units, Win (Roberts) MWF 9

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. Prerequisite: 270. Corequisite: 274A.

3 units, Win (McCarty) MWF 8

271C. Water Treatment Process Design—Analysis of specialized water pollution control processes such as adsorption, oxidation, and air stripping. Emphasis on physical and chemical processes in 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. Prerequisite: 270, 271A.

3 units, Spr (Roberts) MWF 8 alternate years, not given 1995-96


2 units (Kavanaugh) alternate years, given 1995-96

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 to 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 (Leckie) MWF 9

273A. Water Chemistry Laboratory—Laboratory application of techniques for the analysis of natural waters and wastewaters, emphasizing instrumental techniques.

2 units, Win (Leckie) T 1:15-5:05

274A. Environmental Microbiology I—Fundamental aspects of microbiology and biochemistry. Biochemical and biophysical principles of biochemical reactions, energetics, and mechanisms of energy

3 units, Win (Spormann) TTh 10, W 2:15

274B. Environmental Microbiology II — Microbial interactions with the environment. Fundamentals in bacterial genetics: DNA structure/function, mutations, mapping of mutations, complementation of mutations and cloning of genes, gene and protein fusions. Sensing the environment: regulation of gene expression, two component regulatory systems, gene regulation in response to light, O₂, partial pressure, osmolarity, nutrient limitation. Induction of metabolic pathways, cell-cell communication. Detection of microorganisms in the environment (geneprobes, PCR as analytical technique, immunoprobes, enzymeprobes). Prerequisite: 274A.

3 units, Spr (Spormann) TTh 9

274C. Environmental Microbiology Laboratory — Microbiological, biochemical, and molecular procedures for characterizing microbes: basic microbiological techniques, 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. Prerequisites: 274A, 274B.

2 units (Spormann) given 1995-96

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, and 273A.

3 units (Leckie) alternate years, given 1995-96

275B. Water Quality Control Processes II — Lab and pilot plant studies of aerobic and anaerobic biological processes for the treatment of water and wastewaters. Prerequisites: 271B and 273A (or equivalent), and 274A.

3 units, Spr (McCarty) M 1:15-5:05
Th 2:15-5:05 alternate years, not given 1995-96

277. Sustainable Economic Development: A Global Challenge — Sustainable development has become a new paradigm in the international arena. How to integrate sustainability criteria (environmental, political, and social) into economic development strategies of developing and industrial economies. The role of population, growth theories, valuation of natural resources, debt, trade and foreign aid. Operationalizing sustainable development at the macro and micro level.

2 units, Win (Umaña) W 6-7:40 p.m.


3 units, Aut (Hildemann) MWF 10


3 units, Spr (Hildemann) MWF 10

279S. Environmental Health — Enroll in Health Research and Policy 214.) Methods for the study of (current) environmental factors that influence human health, leading to measures for their control. Physiological coping mechanisms and controversial issues of environmental health protection. Possible topics: ozone air pollution, poisonous dusts, halogenated hydrocarbons in water, and radon and cancer. Experts from the medical faculty and from other institutions assist in discussions. Enrollment limited to 12.

2 units, Win (Beard, Staff)

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 equations 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 (plane stress, plane strain and axisymmetry). Element families,

4 units, Aut (Pinsky) MW 11-12:15
computer lab F 3:15


4 units, Spr (Pinsky) MWF 10
computer lab F 2:15

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. Prerequisite: 296A. Recommended: 203.

3 units, Win (Kiremidjian) TTh 12:50-2:05

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 (Staff) MWF 10


3 units, Spr (Law) MW 12:50-2:05


Prerequisites: basic courses in design of steel and reinforced concrete structures.

4 units, Aut (Krawinkler) TTh 11 W 2:15-4:05

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 loads 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) TTh 10
Th 2:15-4:05

287. Structural Performance and Failures —Basic concepts in 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; failure prevention mechanisms; illustration with real life examples.

2 units, Spr (Moncarz) M 3:15-5:05

288. Computer Methods in Structural Engineering —Introduction to basic techniques for the development of structural engineering analysis and design software. Topics: basic data structure such as array, list, stack, queue, tree, and graph; computer representation of engineering systems; implementation of advanced numerical methods; organization, processing, and automated conformance checking of design codes and standards; introduction to computer graphics and geometric transformations. Prerequisites: 281A, 285 or equivalent, and Computer Science 106A or equivalent.

3 units, Win (Law) MW 12:50-2:05


3 units (Borja) given 1995-96

Prerequisites: 190, Mechanical Engineering 238A, or equivalents.

3 units, Spr (Borja) MWF 10
301. Thesis — Investigation of an engineering problem; required of candidates for degree of Engineer. Prerequisite: 190 or equivalent.

2 units, Win (Borja) MWF 11

293. Experimental Soil Mechanics — Lab determination of stress-strain-strength parameters for soils under drained and undrained loading conditions. Six lab experiments. Prerequisite: 190 or equivalent.

2 units, Win (Borja) by arrangement

294. Issues in Geotechnical Failures — Causes and consequences of failure in geotechnical engineering; technical, ethical, economic, legal, and business aspects; failure analysis and forensic problems; prevention, liability, and dispute management; long term trends related to the changing role of engineers.

3 units, Aut (Meehan) Th 8:20-10:50

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 (Smith) MWF 10, F 9

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; introduction to nonlinear dynamics. Prerequisite: 296A.

4 units, Win (Smith) MWF 10, F 9

298A,B,C. Structural Engineering and Geomechanics Seminar — Lectures on topics of current interest in professional practice and research. Recommended for all graduate students.

1 unit, Aut, Win, Spr (Law) W 4:15-6

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, by arrangement

300. Thesis — Investigation of an engineering problem; required of candidates for degree of Engineer. Prerequisite: Geological and Envi-
rnonmental Sciences 230 or equivalent. Recommended: Math. 130, Math. 131 or Mechanical Engineering 200B, or equivalents.
4 units, Spr (Freyberg) MWF 9
plus one hour by arrangement

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.
4 units, Aut (Kitanidis) MWF 10
additional units by arrangement

4 units (Monismith) given 1995-96

2-3 units (Reinhard)
alternate years, given 1995-96

372. Mass Transfer in Aqueous Systems — 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 transport in surface and groundwater, and to hazardous chemical behavior. Prerequisites: 270, 271A.
2-3 units (Roberts)
alternate years, given 1995-96

2 units (McCarty)
alternate years, given 1995-96

376. Organic Instrumental Analysis in Environmental Sciences — Theory and practice of instrumental methods used in environmental engineering and sciences, emphasizing determination of organic substances by gas chromatography, mass spectrometry, and high pressure liquid chromatography. Interpretation of mass spectra adaptation of techniques to specific environmental matrices. Consideration of case studies.
3 units, Sum (Reinhard, Lopez-Avila)
alternate years, not given 1995-96

379. Environmental Management and Policy Analysis — (Same as Business 408B.) 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. Visiting speakers from industry and nonprofits cover the basics of environmental science and economics, 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) TF 3:20-5:05

386A,B,C. Intelligent Systems for Organizational Problem Solving — (Same as Engineering-Economic Systems 386A,B,C.) Advanced seminar focusing on the nature of planning and other forms of problem solving in real-world organizations in the public and private sector, and on the development of computer-based methods to support and enhance organizational problem solving. Participants review and critically discuss their own research and the latest research literature in these topic areas, focusing on relevant work from multiple disciplines including behavioral and social sciences, economics, systems and decision sciences, and computer science and Artificial Intelligence. Research subjects include organization theory, organizational design, large-scale and decentralized planning in business and public sector organizations, group and organizational decision making, team theory, coordination theory, and computer-supported cooperative work.
1-3 units, Aut, Win, Spr (Fehling, Levitt)
by arrangement

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 1995-96

398. Report on Civil Engineering Training — Provides on-the-job training under the guidance of experienced, on-site supervisors and 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) by arrangement

399. Advanced Engineering Problems — Individual projects on selected topics. Provides for 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) by arrangement

400. Thesis — Dissertation for Ph.D. degree. Aut, Win, Spr (Staff) by arrangement

**COMPUTER SCIENCE**

*Emeriti: (Professors)* George B. Dantzig, Robert W. Floyd, John G. Herriot, Donald E. Knuth

*Chair:* John Hennessy

*Associate Chair for Education:* Eric S. Roberts

*Assistant Chair for External Relations and Graduate Studies:* Carolyn E. Tajnai


*Associate Professors:* Michael Genesereth, Anoop Gupta, Oussama Khatib, John Mitchell, Yoav Shoham

*Assistant Professors:* Mary G. Baker, David Dill, Andrew Goldberg, Monica Lam, Marc Levy, Rajeev Motwani, Serge A. Plotkin, Mendel Rosenblum, Andrew M. Stuart, Carlo Tomasi, Jennifer Widom

*Professors (Research):* Thomas Binford, Richard Fikes, Gido Wiederhold

*Associate Professors (Teaching):* Charles A. Bigelow, Eric S. Roberts

*Courtesy Professors:* Michael J. Flynn (Electrical Engineering), Martin Kay (Linguistics), Grigori Mints (Philosophy), David E. Rumelhart (Psychology), Edward A. Shortliffe (Medicine), Fouad A. Tobagi (Electrical Engineering)

*Courtesy Associate Professors:* Giovanni De Micheli (Electrical Engineering), John T. Gill, III (Electrical Engineering), Mark A. Horowitz (Electrical Engineering)

*Courtesy Assistant Professors:* Russ B. Altman (Medicine), David Heeger (Psychology), Teresa Meng (Electrical Engineering), Mark A. Musen (Medicine)

*Affiliated Professor (Research):* David Luckham (Electrical Engineering)

*Lecturers:* Stephen Clausing, Todd Feldman, Margaret Johnson, Nicholas J. Parlante, Julie Zelenski


*Consulting Associate Professor:* Daniel Weise

*Consulting Assistant Professors:* Craig Partridge, Ted Selker

Several large computer systems at the Department of Computer Science (CS) play a major role in providing the computing environment for research and administration. Course work and instruction is done on the systems available at L&IR (Libraries and Information Resources). Students in CS also have access to SUNET, the University-wide ethernet system, or to other systems through the nationwide Internet.

The systems are the following:

XENON, a SUN 4/670 Multiprocessor (4 CPUs).

This system is exclusively for student use as a primary "home base" machine for electronic mail and text processing.

SUNBURN, a SUN4/490 is used for departmental administration.

PESCA DERO, a DECsystem 5000/240, serves the centralized needs of the Distributed Systems Lab.

FLAMINGO, a DECsystem 5000/240, serves the centralized needs of the Robotics Lab.

HOOKIPA, a Silicon Graphics multiprocessor (8 CPUs) computer server, 4D380GTX, supports the Distributed Systems Lab and the Numerical Analysis Group.

HPP, a SUN 4/490, supports research on knowledge-based systems and applications of artificial intelligence to biomedicine and engineering. Students doing research in the Knowledge Systems Lab may be granted access to the HPP system.

SAIL, a DECserver 5000/200, supports research in AI and DB2, an IBM POWERServer 6000/570, supports research in databases and is used by one of the research groups.

In addition, approximately 25 medium scale Unix operating systems are used by specific research projects at CS.

The department also operates and supports hundreds of workstations, among which are Digital Equipment Corporation, SUN Microsystems, Hewlett-Packard, Silicon Graphics, NeXT, and IBM. There are approximately 20 laser printers for research and administration use. In addition, the department operates a Graphics Lab that consists of 10 SGI 4D/35TG Color Workstations.
These systems are reserved for graduate course work only.

At present, students supported by research can receive an account on their sponsored machine. All CS students and alumni receive an account on XENON.

**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.

**GRADUATE PROGRAMS**

**MASTER OF SCIENCE**

The University's basic requirements for the M.S. degree are discussed in the "Advanced 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 31, 1994. 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) letter grade indicator (LGI) or better. The 45 units may include no more than 21 units of courses from those listed 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 good 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 22 (for specialization 5 only), 107, 108, 109A, 109B; Electrical Engineering 182; Math. 109 or 120.

**Requirement 2** — The following core courses or their equivalent must be completed: CS 137 or 237A, 143, 145 or 245, 154 or 254, 157, 161, 240A; Electrical Engineering 282; 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. Six 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, 381, 382
   c) At least 6 more units selected from '2b' and: CS 194, 244B, 244C, 245B, 249, 315A, 315B, 341, 342, 343, 345A, 345B, 346, 347, 348A, 348C, 349; Elect. Engr. 183, 272A, 272B, 281, 284, 374, 482, 484, 487, 488, 489; Psych. 267
3. Software Theory
   a) CS 242, 243, 258, 260
   b) At least one of: CS 244A, 245A, 342, 343, 345A
   c) At least one course from the following: CS 254, 363, 367A, 367B
   d) At least one additional course selected from 3b, 3c, CS 245B, 345B, 441; Elec. Engr. 418

4. Theoretical Computer Science
   a) CS 254 or 261, 257 or 258, 260

5. Symbolic and Heuristic Computation
   a) CS 222 or 257; 224 or 227; 226 or 270; one of the following: 520, 522, 524, 525, 526, 527

6. Database
   a) CS 245A
   b) Two of: CS 245B, 345A, 345B, 346, 347
   c) Four additional courses selected from ‘6b’ and: 228, 240B, 244A, 244B, 249, 271, 395; Med Info. Sci. 212

7. Human-Computer Interaction
   a) CS 147, 247A, 247B
   b) At least 6 units from: CS 248, 273, 348C, 377 (may be taken repeatedly), 378
   c) A total of 21 units from the above and: CS 249, 348B; Elec. Engr. 418; Mech. Engr. 101, 215, 221; Psych. 203, 221, 266; Communication 269, 272, 370, 371, 372; Med. Info. Sci. 210, 212

Requirements — 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 “Advanced Degrees” section of this bulletin. Applications to the Ph.D. program and all supporting documents must be received before December 31, 1994. 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 letter grade indicator (LGI) of 3.0 or better must be maintained.
Graduate student assistantships are available. Half-time assistants 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 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
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, 105A 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 105A meets the Area 6 University distribution 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 106X, which covers most of the material in 106A,B in a single quarter. All instruction in CS 106 uses the ANSI C language, but students in 106X are not expected to have prior exposure to C. In certain unusual cases, it may be appropriate for students with a strong background in programming and some experience in C to enroll directly in 106B, so as to concentrate on the material developed in the second half of the sequence. 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 109A,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 109A,B sequence 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 — 105A. For scientific use — 106A.
For a technical introduction — 106A.
For significant use — 106A,B or 106X, followed by 107, 108, and 109A,B.

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, any quarter (Roberts, Osterloh)

1U. Introduction to Unix — Tutorial on using the Unix operating system. Topics: the emacs editor, the file system, the Unix shell, and standard Unix tools (make, awk, sed, grep, etc.). Includes simple shell programming, but it is not a programming course and assumes no prior exposure to programming.
2 units, Win (Staff) MW 12

22. 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, Win (Feldman) MW 3:15-4:30

50. Problem Solving with Mathematica — For engineers, physicists, mathematicians, and others who frequently need to solve mathematical or quantitative problems. Comprehensive introduction to Mathematica, an interactive mathematical software which incorporates a high-level programming language. Use of Mathematica to manipulate expressions, find roots, solve differential equations, visualize functions and data, import and export data, and to write functions.
2 units, Win (Blachman) F 12-1

UNDERGRADUATE

104. History of Computers — (Enroll in Science, Technology, and Society 161.)
5 units, Win

105A. Introduction to Computers — For non-technical majors. Develops an understanding of what computers are and how they work. Survey of the great ideas of computer science. Some programming provides practical experience in construction of computer algorithms and illustrates design techniques for managing complexity. Methods are shown to be valid as general problem-solving tools. The capabilities and limitations of computers. Artificial intelligence and the philosophical implications of computer intelligence. No previous knowledge of computer science is assumed. Students in technical fields and students looking to acquire programming skills are encouraged to take 106A or 106X. Prerequisite: minimal math skills. DR:6(8)
*5 units, Aut (Zelenski) MWF 1:15
Spr (Johnson) MWF 10

106A. Programming Methodology — For students in technical disciplines; no prior experience is assumed. Broad introduction to the engineering of computer applications. Software engineering principles are stressed: 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: 105A, 106X. DR:6(8)
*5 units, Aut (Clausing) MWF 10
Win (Roberts) MWF 1:15
Spr (Feldman) MWF 3:15

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. DR:6(8)
*5 units, Aut (Feldman) MWF 11
Win, (Clausing) MWF 1:15
Spr (Roberts) MWF 1:15

106X. Programming Methodology and Abstractions (Accelerated) — Covers 70% of the material in 106A,B. Intended as a one-quarter preparation for 109A for students whose previous programming experience is sufficient to help them cover this fundamental material more rapidly. DR:6(8)
*5 units, Aut (Feldman) MWF 3:15
Win, (Clausing) MWF 2:15
Spr (Parlante) MWF 1:15

107. Programming Paradigms — Introduces several approaches to programming: the object-oriented paradigm, concurrent programming, and the functional programming model. Languages include C++ and Lisp. Small programming projects. Prerequisite: 106B or 106X.
*5 units, Aut (Parlante) MWF 2:15
Spr (Zelenski) MWF 11

108. Object-Oriented Systems Design — Provides experience in implementing modern software systems, giving students the tools to tackle large-scale programs. Topics: review of C++, the structure of object-oriented toolboxes, using a class library for a hierarchical window system, design and implementation of graphical interfaces, software engineering

* May be taken for 3 units by graduate students.
109A.B. Introduction to Computer Science —
Two-quarter introduction to the conceptual and mathematical foundations of computer science. 109A: induction and recursion; analysis of the running time of programs; trees, lists, sets, functions, relations; basic data structures. 109B: graph algorithms, finite automata and regular expressions, context-free grammars, propositional and predicate logic, introduction to switching circuit design via propositional logic. Proof techniques, modeling, and abstraction are themes for the sequence. Functional programming exercises explore and exemplify these concepts. Prerequisite for 109A: 106B or 106X. Prerequisite for 109B: 109A.

109A. DR:6(8)
*4 units, Aut (Clausing) TTh 9:30-10:45
Win (Parlante) MWF 9

109B. *4 units, Win (Johnson) MWF 10
Spr (Ullman) MWF 2:15

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, Aut, Spr (Chou) MW 12:50-2:05

112. Computer Organization and Design — (Enroll in Electrical Engineering 182.)
4 units, Aut, Win (Staff) TTh 1:15-2:30

137. Fundamentals of Numerical Computation —
The fundamental issues of numerical computation for the mathematical, computational, and physical sciences, and engineering. Problems of accurately computing algebraically exact 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 (Olinger) MW 11-12:15
Spr (Golub) MW 11-12:15
Sum (Staff)

140. Concurrent Programming — Principles of concurrent programming focusing on low-level, semaphore, monitor, and message-passing approaches to process communication and synchronization. Emphasis on principles and algorithms, rather than on implementation. Prerequisites: 107, 109A.

3 units, Aut (McGuire) MWF 2:15

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, 109B.

*4 units, Aut (Staff) MWF 3:15
Spr (Staff) MWF 10

145. Introduction to Databases — Data models: entity-relationship, relational, network, hierarchical, object-oriented. Relational algebra and calculus, relational database query languages. Dependencies, constraints, and normal forms. Role of databases in application environments. Designing a database for an application. Interactive and programming interfaces to database systems. Database transactions from the application perspective. Includes a substantial database application implementation project using a database management system. Prerequisites: 107, 109B.

*4 units, Aut (Widom) TTh 9:30-10:45

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 are expected to participate in discussions of the cases and do weekly interface analysis and design exercises which do not require programming.

3-4 units, Aut (Winograd, Liddle)
MW 8:15-9:45

154. Introduction to Automata and Complexity Theory — Regular sets: finite automata, regular expressions, equivalences among notations, methods of proving a language not to be regular; context free languages: grammars, pushdown automata, normal forms for grammars, proving languages non-context free; Turing machines; equivalent forms, undecidability. Nondeterministic Turing machines:
properties, the class NP, complete problems for NP. Alternate: 254. Prerequisite: 109B.

*4 units, Win (Pratt) MW 3:15-4:30
Spr (Motwani) MWF 3:15

154N. Introduction to NP Completeness — Turing machines. Reducibilities among problems, Cook’s theorem, examples of NP-complete 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, Win (Pratt) MW 3:15-4:30
Spr (Motwani) MWF 3:15


*4 units, Aut (Manna) TTh 11-12:15
Spr (Genesereth) TTh 1:15-2:30

157L. Logic and Automated Reasoning Laboratory

1 unit, Aut (Manna)


*4 units, Aut (Plotkin) TTh 1:15-2:30
Spr (Staff) TTh 2:45-4

191. Senior Project — Group projects under faculty direction. Register using the section number associated with the instructor.

3-6 units, any quarter (Staff) by arrangement

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) by arrangement

193D. C++ and Object-Oriented Programming — C++ programming language and object-oriented programming paradigm. Discussion of several substantial class libraries for data abstraction and graphical user-interface design. Intensive programming assignments. Prerequisites: knowledge of C and basic programming methodology as developed in 106B or 106X.

*4 units, Win (Parlante) MW 12:50-2:05

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. Previous experience in a high-level language other than BASIC and experience as a UNIX user required. Prerequisite: knowledge of programming at the level of 106B.

3 units, Aut (Burbank) MW 3:15
Spr (Staff) MWF 1:15

193X. X Window System Programming — Develop user interfaces using the X library (Xlib) and the X toolkit intrinsics (Xi). OSF/Motif is used in the examples and programming assignments; emphasis is on general Xlib and Xi techniques. Progressive exercises develop skills in using the X client/server event model, an Xi-based widget set, and more advanced Xlib operators. Prerequisites: experience with C, development in a UNIX environment.

2 units, Aut (Yang) MW 11

194. Software Project — Student teams complete a significant programming project through the phases of specification, coding and testing under faculty supervision. Lectures provide additional background on software engineering methodologies. Prerequisite: 108.

3 units, Spr (Clausing) MW 12:50-2:05

196. Microcomputer Consulting — Consulting in a microcomputer environment, focusing on the Apple Macintosh and DOS operating systems. Biweekly lectures outline the microcomputer environment on campus and demonstrate the skills needed to consult in such an environment. Students also work as the on-duty consultant at a campus cluster. Pre- or corequisite: 1C.

2 units, Aut, Spr (Roberts, Brokaw) TTh 7 p.m.

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 (Roberts-Chinn) MW 7 p.m.
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. Three meetings weekly discuss introductory material in general, 106 specifically, and teaching techniques. Application and interview required; see the receptionist in Computer Science/Tresidder for information. Prerequisite: 106B or 106X.

4 units, Aut, Win, Spr (Roberts, Lilly, Rollins) MTW 4:15-6

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) by arrangement

199P. Independent Work—Like 199, but graded either Satisfactory or No Credit.

any quarter (Staff) by arrangement

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.

1 unit, Aut (Feldman) Th 3:15-4:45
Spr (Clausing) Th 3:15-4:45

201. Computers, Ethics, and Social Responsibility—(Same as Science, Technology, and Society 215.) 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, e.g., privacy, reliability and risks of complex systems, and the responsibility of professionals for the applications and consequences of their work. Small group discussion and critical reading of source materials, emphasizing developing analytical skills for approaching these questions. Prerequisite: 106B or 106X.

3-4 units, Spr (Roberts) MWF 11-12:15

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) T 4:15-5:30

203. Self-Directed Research—Students discuss, learn about, and perform self-directed research. Focuses on: 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 1994-95

205. Mathematical Methods for Robotics and Vision—Overview of the mathematical background necessary for research in robotics and vision. Topics: geometry, rigid body mechanics, control theory, signal processing, stochastic estimation, and numerical methods. Prerequisites: 106B or X, Math. 43 and 113, or equivalents.

3 units, Aut (Tomasi) TTh 9:30-10:45

211. Logic Design—(Enroll in Electrical Engineering 381.)

3 units, Aut, Win


3 units, Aut, Win

221. Introduction to Artificial Intelligence—Broad technical introduction to core concepts. Topics: neural networks, production-rule systems, learning, vision, search, knowledge representation, deduction, uncertain reasoning, expert systems, planning, intelligent agent architectures, and natural language understanding. Prerequisites: 109A and B, knowledge of propositional and predicate logic, working knowledge of Lisp at the level of 107.

3 units, Aut (Latombe) MW 11-12:15
Spr (Nilsson) TTh 11-12:15

222. Autonomous Systems—Required for students taking 224, and recommended for students planning to concentrate in robotics and/or artificial intelligence. Introduction to computer-controlled autonomous systems (e.g., robots, pilotless vehicles, and automated factories). Basic concepts of autonomous systems theory: features, active elements, networks, systems, state machines, procedures, Petri nets. Sources of difficulty in the design of such systems: incompleteness of information, sensorimotor limitations, and computational resource bounds. Focuses on principal topics in system architecture: reactivity, representation, programmability, planning, communication, and self-replication. Theoretical analysis of various pragmatic tradeoffs; e.g., cost, quality, time to market. Prerequisite: 106B or X or equivalent.

3 units, Aut (Genesereth) TTh 1:15-2:30
223A. Introduction to Robotics — Basics, and a review of current applications. Topics: manipulator kinematics and inverse kinematics; manipulator dynamics, motion, and force control; motion planning and robot programming. Recommended: knowledge of matrix algebra and some familiarity with basic control theory and rigid body mechanics. 3 units, Win (Khatibi) MWF 3:15

223B. Introduction to Computer Vision — Fundamental issues and techniques of computer vision. Image formation, edge detection and image segmentation, line-drawing interpretation, shading, texture, stereo, motion, shape representation. Student teams implement some of the algorithms covered and evaluate them on synthetic and real images. Prerequisites: 106B or X, Math. 43 and 113, or equivalents. 3 units, Win (Tomasi) TTh 1:15-2:30

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). Student programmed robot contest. Programming is in Common Lisp on the Macintosh; course work is done in teams. Prerequisites: 222 (may be taken concurrently), Lisp programming ability, and familiarity with the Macintosh computer. 3 units, Aut (Genesereth) TTh 2:45-4

225. Experimental Robotics — Hands-on experience with robotic manipulation and navigation systems. Topics: kinematic and dynamic control of motion, compliant motion and force control, sensor-based collision avoidance, motion planning, assembly planning, task specifications, and robot-human interfaces. Limited enrollment. Prerequisite: 223. 3 units, Spr (Khatib) TTh 2:15-3:30

226. Expert System Applications — For technically or business-oriented students. Expert systems technology is the most important application technology to emerge from the science of Artificial Intelligence. Topics: definition of expert systems, transition from research in AI laboratories to start-up companies and corporate R&D; knowledge engineering, knowledge-based programming, knowledge acquisition methodology, technology transfer issues, evolution of the technology as applied to business and government problems, current and future impact. Case studies, readings, guest lectures. 3 units, Spr (Barr, Tessler) TTh 9:30-10:45

227. Algorithmic Techniques in AI — AI algorithmic techniques explained in detail, and implemented in Prolog. Topics: search, backward and forward chaining, production systems, truth maintenance, reasoning with uncertainty, constraint satisfaction. Application areas: temporal reasoning, learning and natural language. Students with no prior Prolog experience may take additional 1-unit tutorial. Prerequisites: programming experience, familiarity with basic notions in data structures and algorithms. Recommended: previous or concurrent course in AI. 3 units (Shoham) not given 1994-95

227L. Algorithmic Techniques in AI Laboratory 1 unit (Shoham) not given 1994-95

228. Introduction to Knowledge Systems — For graduate students in the sciences and engineering building or using knowledge systems. Foundations and principles for building knowledge systems. Foundations, including approaches to semantics, hierarchical search methods and principles of knowledge and software engineering. The symbol and the knowledge level. Constraint graphs are models for exploring complexity and the distribution of hard problems. Representations for time, space, and certainty in reasoning. Computational approaches for heuristic classification, configuration, and diagnosis. 3 units, Win (Stefik) TTh 4:30-5:45

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, Win (Nilsson) MW 11-12:15

229B. Project in Machine Learning — Working in pairs, students implement machine learning algorithms or modify existing ones, and may experiment with their own ideas or choose from a wide variety of algorithms and variants proposed in the machine learning literature. Use of the machine learning library, MLC++ (a C++ implementation of important machine learning modules). Prerequisites: 229, and prior knowledge of C++, or consent of the instructor. 3-6 units, Spr (Kohavi)

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; itera-
tive methods and least squares. Parallel techniques. Prerequisites: 106A, 137, Math. 103 or 113.

3 units, Aut (Golub) MW 11-12:15


3 units, Win (Stuart) MWF 11


3 units, Spr (Oliger) MW 11-12:15

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. Prerequisites: 108. Recommended: Electrical Engineering 182.

*4 units, Aut (Rosenblum) MW 1:15

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, and history and experience of systems programming. Prerequisite: 240A or equivalent.

3 units, Win (Baker) MWF 1:15

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) TTh 1:15-2:30

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 (Lam) MW 11-12:15

244A. Computer Networks: Architectures and Protocols — Objectives of computer networks; network structure and components; switching techniques (circuit switching and packet switching); network functions; layered network architectures (the ISO reference model); data link protocols (character-oriented protocols, bit-oriented protocols, error checking, window flow control, and multi-access protocols); network control (datagrams, virtual circuits, routing, and congestion control); transport and session protocols (end-to-end communication, interconnection of networks); presentation layer protocols are cited for point-to-point, satellite, packet radio, and local area networks. Prerequisite: 240A.

3 units, Aut (Tobagi) (Enroll in Electrical Engineering 384)

Win (Partridge) TTh 2:45-4

244B. Distributed Systems — Overview of distributed systems, primarily as an extension of uniprocessor operating systems to span networks. The impact of networking on each of the subsystems and issues discussed in 240A,B, including basic architectural models; network-transparent message-passing and remote procedure call; network-wide virtual memory; distributed file systems; encryption, and multi-site concurrency control, replication, and error recovery. Prerequisites: 240B, 244A.

3 units, Spr (Baker) TTh 2:45-4

244C. Distributed Systems Project — Companion project option for students taking 244B. Corequisite: 244B.

3-6 units, Spr (Baker)


3 units, Win (Garcia-Molina) TTh 11-12:15

245B. Database System Project Course — A major database system implementation project realizes

* May be taken for 3 units by graduate students.
the principles and techniques covered in 245A. Students build a complete prototype database management system, from file structures through query processing. Focuses on the project requirements and on advanced techniques and research projects in database system implementation. Prerequisites: 145, 245A.

3 units, Spr (Widom) TTh 9:30-10:45

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 HyperCard. 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 useability, visual design and aesthetics, metaphors and scenarios, brainstorming and rapid prototyping. Enrollment limited. Prerequisite: 147.

3-4 units, Win (Singer, Verplank, Hartfield) MW 2:15-3:45

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. Prerequisite: 147.

3-4 units, Spr (Winograd, Wieckert) MW 2:15-3:45

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, Spr (Levoy) TTh 9:30-10:45

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 (Staff) TTh 9:30-10:45

254. Automata, Languages, and Computability — Enriched version of 154, recommended for graduate students and for undergraduates strong in math. Alternate 154. Prerequisite: 109B.

*4 units (Pratt) not given 1994-95


3 units, Win (Manna) TTh 11-12:15

256L. Formal Methods for Concurrent and Reactive Systems Laboratory

2 units, Win (Manna)


3 units, Win (Manna) TTh 2:45-4

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) MW 12:50-2:05

260. Concrete Mathematics — Finite difference calculus; manipulation of sums and products, properties of binomial coefficients, Stirling numbers,
harmonic numbers, Fibonacci numbers; use of generating functions to solve recurrence relations; asymptotic expansions; analysis of algorithms. Emphasis is on obtaining simple closed-form answers to problems when possible. Prerequisites: 109B, Math. 42, or equivalents.

3 units, Win (Basch) MWF 10

261. Algorithmic Paradigms — Design and analysis of algorithms for sequential and parallel architectures. Topics: parallel algorithms and circuits, on-line algorithms, graph algorithms, approximation algorithms, number-theoretic algorithms and cryptography, advanced data structures such as B-trees and union-find. Prerequisite: 161.

3 units (Goldberg) not given 1994-95

264. Introduction to Combinatorial Theory — Elementary combinatorics. Topics: permutations, combinations, partitions; the principle of inclusion and exclusion; Ramsey's theorem; Burnside's lemma; Polya's counting theorem; the elementary theory of graphs and trees; flow in networks; matching problems; an introduction to matroids. Prerequisites: 109B, Math. 44, or equivalents.

3 units (Staff)

265. Basic Tools in Computer Systems Modeling — (Enroll in Electrical Engineering 284.)

3 units, Win

270. Computer Applications in Medicine — (Same as Medical Information Sciences 210.) Survey of use of computers in the medical field. Includes variety of research and applied environments and factors which influence the acceptance of these applications. Topics: integration of computer systems in the medical center, hospital information systems, ambulatory care systems, medical databases 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) TTh 1:30-2:45

271. Computer-Based 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. No medical background required. Prerequisite: at least one programming course.

3 units, Win (Shortliffe) TTh 1:30-2:45

272. Medical Informatics Project Course — (Enroll in Medical Information Sciences 212.)

3 units, Spr

273. Concepts of Text for Human-Computer Interfaces — (Same as Art 281.) 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) TTh 9:30-10:45

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, Aut (Barr, Tessler) TTh 9:30-10:45

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) M 7-8:30 p.m.

PRIMARILY 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.

1 unit, Aut (Staff) MW 4:15-5:30

306. Recursive Programming and Proving — Uses LISP language and techniques for proving the correctness of recursive programs. Computing with symbolic expressions rather than numbers, e.g., algebraic expressions, logical expressions, patterns, graphs, and computer programs. Pattern matching and syntax directed computation. Preparation for work in artificial intelligence is emphasized. Prerequisite: 109B.

3 units (McCarthy)

309. Industrial Lectureships in Computer Science — The department invites an outstanding computer scientist to give a course in his/her specialty.
322. Philosophy of Computation — (Enroll in Philosophy 395A.)
3 units, Win

315A. Parallel Computer Architecture and Programming — Principles and tradeoffs in design of parallel architectures. Emphasis on naming, latency, bandwidth, and synchronization in parallel machines. Case studies on shared-memory, message-passing, dataflow, and data-parallel machines illustrate techniques. Interleaved with architectural studies are lectures on techniques for programming parallel computers. Programming assignments on one or more commercial multiprocessors. Prerequisites: 140, 212, reasonable programming experience.
3 units, Spr (Gupta) TTh 11-12:15

315B. Parallel Programming Project — Continuation of 315A. A significant parallel programming project is required. Several different shared-memory, message-passing, and data-parallel machines are available for use in projects. 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) not given 1994-95

317. Fault Tolerant Computer Systems — (Enroll in Electrical Engineering 489.)
3 units, alternate years, given 1995-96

318. Testing Aspects of Computer Systems — (Enroll in Electrical Engineering 488.)
3 units, Spr (McCluskey) alternate years, not given 1995-96

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

321. Representing Large Bodies of Knowledge: Issues in Representation, Inference, and Ontology — Representation "thorns" such as time, space, belief, desire, hypotheticals, plus specific topics drawn from everyday experience. The CYC project anchors discussions, and students construct running applications as term projects.
3 units (Staff) not given 1994-95

322. Philosophy of Computation — (Enroll in Philosophy 395A.)
3 units, Win

323. Applications of Nonmonotonic Reasoning — Systems of nonmonotonic reasoning emphasizing circumscription. Applications to formalizing common sense knowledge and reasoning. Situation calculus and its variants. Formalizing context. Formalizing facts about knowledge. Prerequisite: basic knowledge of logic such as 157, or Philosophy 160A.
3 units, Win (McCarthy) TTh 1:15-2:30

324. Foundations of Knowledge Representation — Formal treatment of reasoning about time, action, knowledge, and uncertainty; emphasis on epistemological questions and their relevance to AI. Topics: logics of time and action, logics of knowledge and belief, nonmonotonic logics, fuzzy logics, and probabilistic logic. Prerequisites: an understanding of logic and basic model theory.
3 units (Shoham) not given 1994-95

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, Win (Latombe) MW 11-12:15

326. 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.
3-6 units, Spr (Latombe) MW 11-12:15

327. Advanced Robotic Manipulation — Topics: redundant manipulators, control architectures, operational space framework, robot motion/force control, control at kinematic singularities, control of multiple manipulators, dextrous dynamic coordination of macro/minimal manipulator systems, effective inertia, sensor-based primitives, artificial potential
field and force strategies, robot design. Prerequisites: 223, consent of instructor.
3 units, Spr (Khatib) MW 2:15-3:30

328A. Principles of Experimentation for Computer Vision — Vision is essentially a measuring process. Introduction to the theoretical and practical aspects of quantitative experimentation in computer vision. Topics: statistical elements of measurement theory, image acquisition devices and techniques, camera calibration, experiment design and setup, and presentation of experimental data. Lab project. Limited enrollment. Prerequisite: 205 or consent of instructor.
3 units, Spr (Tomasi) TTh 1:15-2:30

328B. Topics in Computer Vision — Fundamental issues and mathematical models for computer vision. Possible topics: image formation, edge detection and image segmentation, line-drawing interpretation, shading, texture, stereo, motion, shape representation. Students implement the algorithms and evaluate them on synthetic and real images. Term project survey of an area of computer vision. Students work in small groups. Prerequisites: 106B or X, Math. 43 and 113, or equivalents.
3 units (Tomasi)
alternate years, given 1995-96

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.
1-3 units

330. Data Communication — (Enroll in Statistics 327.)
3 units, Spr (Staff)

3 units (Golub) not given 1994-95

332. Numerical Methods for Initial Boundary Value Problems — Initial boundary value problems 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 (Oliger) not given 1994-95

333. Numerical Analysis of Dynamical Systems — (Enroll in Mechanical Engineering 233B)
3 units, Spr (Stuart)

334. 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.
by arrangement

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 (Perekh’s thesis, leaky bucket, fair queuing) and high-speed switching (input vs. output queuing, crossbars and banyans). Prerequisite: 244A.
3 units (Partridge) not given 1994-95

342. Programming Language Design — (Same as 358.) 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, Spr (Mitchell) MW 12:50-2:05

343. Topics in Compilers — Compilation techniques for modern machines. Topics: data dependence analysis, interprocedural analysis, instruction scheduling for superscalar machines, loop transformations for parallelism and locality, compilation techniques for distributed memory machines. Prerequisite: 243 or equivalent.
3 units, Spr (Lam) MW 11-12:15

344. Computer Networks: Modeling and Analysis — (Enroll in Electrical Engineering 484.)
3 units, Spr

3 units (Ullman)
alternate years, given 1995-96
345B. Advanced Topics in Database Systems — Relational database systems extended with complex types and objects; object-oriented database systems. Active database rule languages, systems issues, and theoretical foundations. Database constraint management. Temporal and real-time database systems. Advanced database applications: geographic databases, multimedia databases, scientific databases, database mining. Prerequisites: 145, 245A.

3 units, Win (Widom) MW 2:15-3:30 alternate years, not given 1995-96


3 units, Aut (Garcia-Molina) TTh 11-12:15

347. 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) TTh 11-12:15

348A. Computer Graphics: Mathematical Foundations — Mathematical tools needed for the geometrical aspects of computer graphics. Topics: homogeneous coordinates, transformations and perspective, parametric and implicit curve and surface modeling, representations of solids, geometric algorithms for hidden surface elimination, shadow calculation, ray tracing, etc. Prerequisites: solid foundation in linear algebra and discrete algorithms.

*4 units, Aut (Guibas) TTh 11-12:15

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 photo-realism, 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, Win (Levoy) TTh 9:30-10:45

348C. Topics in Computer Graphics — In-depth study of one or more active research areas in computer graphics, depending on student interest. Sample topics: display of multidimensional data, volume visualization, algorithms and architectures, exotic input and display technologies, modeling of natural phenomena. Project. Prerequisites: 248, 348A, 348B, or consent of instructor.

3 units, Spr (Levoy) TTh 2:45-4

348D. Vision and Image Processing Laboratory — (Enroll in Psychology 267.)

1-3 units, Aut

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 four topics: 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. 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. Pseudorandomness and cryptography. Prerequisites: 154, 264, or equivalent.

3 units, Aut (Motwani) F 2:15-4:05

completeness, and complexity issues. Prerequisite: 258 or consent of instructor.

3 units, Spr (Pratt) TTh 11-12:15
alternate years, not given 1995-96


3 units, Aut (Pratt) MWF 11

354. Probabilistic Reasoning in Computing—Basics of (Bayesian) probability theory as applied to computing and artificial intelligence. Theory is illustrated by case studies. Practical problems in learning, search, approximate reasoning, data analysis, and decision-making under uncertainty. Emphasis is on solving practical inference problems under uncertainty, including their computational aspects. Surveys probabilistic theory and techniques, emphasizing practical rather than theoretical concerns. Prerequisites: 106B or X, 221, a knowledge of basic statistical measures as in Psychology 60.

3 units (Buntine, Cheeseman)
alternate years, not given 1994-95


3 units (Dill) not given 1994-95

356A. Reasoning about Knowledge—Knowledge plays a crucial role in distributed systems, game theory, and artificial intelligence. Material examines formalizing reasoning about knowledge and the extent to which knowledge is applicable to those areas. Issues: common knowledge, knowledge-based programs, applying knowledge to analyzing distributed systems, attainable states of knowledge, and modeling resource-bounded reasoning. Prerequisites: mathematical maturity, an acquaintance with propositional logic.

1-3 units (Halpern)
alternate years, given 1995-96

356B. Reasoning about Uncertainty—Uncertainty must be confronted when designing computer systems. Examines formalizing reasoning about uncertainty in particular approaches based on logics involving probability. Topics: logics of probability, combining knowledge and probability, probability and adversaries, conditional logics of normality, causality, going from statistical information to degrees of belief. Prerequisites: mathematical maturity and an acquaintance with propositional logic.

Recommended: 356A.

1-3 units, Win (Halpern) F 2:15-4:05
alternate years, not given 1995-96


3 units, Spr (Manna) MW11-12:15

3 units, Spr (Mitchell) MW 12:50-2:05

359. Topics in Programming Language Theory—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.

1-3 units, by arrangement

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 (Motwani)
alternate years, given 1995-96

3 units, Win (Goldberg) MW 11-12:15
alternate years, not given 1995-96

363. Network Optimization — Topics: algorithms for network optimization problems, e.g., shortest paths, maximum flows, minimum-cost flows, multicommodity flows, dynamic flows, minimum cuts, matching, and assignment problem. Applications to problems, e.g., transportation, production and project planning, distribution, and open-pit mining.

3 units (Goldberg) alternate years, given 1995-96


3 units, Win (Motwani) 2:15-3:30
alternate years, not given 1995-96

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 hypercubes and related networks. Techniques for reducing the processor-time product for PRAM algorithms.

3 units (Plotkin) alternate years, given 1995-96


3 units, Win (Plotkin) W 2:15-4:05
alternate years, not given 1995-96

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. 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 robotics, vision, and CAGD. No prior knowledge of geometric techniques is assumed. Prerequisite: 161.

3 units (Guibas) not given 1994-95

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 (Goldberg) W 2:15-4:05

371. Medical Decision Analysis — (Enroll in Engineering-Economic Systems 235.)

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. 1994-95 topics: principles from the cognitive sciences for human-computer interaction, reactive and proactive computer agents, filmcraft in user interface design, design and theory of interactive learning technology.

3 units, Aut (Strub) Win, Spr (Staff)


3-4 units, Win (Winograd, Davis) MWF 10

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
390. Industrial Practical Training — 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 in the quarter following 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.

1 unit, Aut (Staff) by arrangement

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. Prerequisite: consent of instructor; register using the section number associated with the instructor.

any quarter (Staff) by arrangement

394. Business Management for Computer Scientists and Electrical Engineers — Focuses on issues involved in business decision making; case method examines real situations and companies. Special 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. Objective is to give the student a firm understanding of typical issues, an appreciation of each of the functional areas of an enterprise, an acquaintance with fundamental management principles, and an ability to pursue areas of further interest independently. Enrollment limited to 60. Prerequisite: graduate student in CS or Electrical Engineering.

4 units, Win (Liddle) MF 8-9:45
Spr (Liddle) (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) by arrangement

399. Independent Project

any quarter (Staff) by arrangement

399P. Independent Project — Graded Satisfactory or No Credit.

any quarter (Staff) by arrangement

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) TTh 9:30-10:45

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 computer programs, 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 (Koza)
alternate years, given 1995-96

426. Genetic Algorithms and Genetic Programming — Genetic algorithms are mathematical algorithms for search, optimization, and machine learning patterned after the evolutionary processes of reproduction, Darwinian survival of the fittest, and genetic recombination. Genetic programming extends genetic algorithms to the evolution of computer programs capable of solving problems. Topics: mathematical basis for genetic algorithms; applications to function optimization, system identification, robotics, control, games, economics, neural network design, pattern recognition, design within constraints, genome and protein sequence analysis; genetic classifier systems; implementation on parallel computer architectures.

3 units, Aut (Koza) TTh 1:15-2:30
alternate years, not given 1995-96

441. Topics in ADA Programming — The ADA language is used as an example for discussing current research in high-level languages for programming large and distributed systems. Related developments in specification languages. Part 1 (ADA language design and programming techniques): multi-task programming, compilation algorithms for tasking, runtime supervisors for distributed systems in ADA, detection of concurrency error: com-
Comparison of ADA with other high level concurrent languages. Part 2: design of specification languages related to ADA, specification, validation, and verification methods for multi-task programs; environments for programming with specifications. Prerequisite: 107.

3 or 4 units, Win (Staff) TTh 9:30-10:45

443. Design and Prototyping Languages — (Enroll in Electrical Engineering 418.)
3-4 units, alternate years, given 1995-96

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) by arrangement

GRADUATE SEMINARS

510. Digital Systems Reliability Seminar — (Enroll in Electrical Engineering 385A.)
1-4 units, Aut, Win, Spr

520. Survey of Research Topics in Artificial Intelligence — Topics vary each year. Current topics: machine learning and discovery, speech or image or language understanding, automatic programming, formal reasoning, nonmonotonic logic, game playing, intelligent computer assisted instruction, knowledge representation, and expert systems. Often involves distinguished outside lectures who are specialists in these fields. Prerequisite: 221 or equivalent.

1 unit, Spr (Staff) T 11

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.
1 unit, Aut, Win, Spr

523. Readings in Artificial Intelligence — Primarily intended 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)

524. Seminar on Expert Systems Research — (Enroll in Medical Information Sciences 229.)
2 units, Spr (Musen, Shortliffe) W 3:30-5
alternate years, not given 1995-96

525. Seminar on Knowledge Acquisition for Expert Systems — (Enroll in Medical Information Sciences 230)
2 units (Musen)
alternate years, given 1995-96

526. Topics in Perception Seminar — (Enroll in Psychology 266.)
1 unit, Win

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.
1 unit, Aut, Spr (Khatib) M 4:15

530. Applied Mathematics/Scientific Computing Seminar
1-3 units, any quarter (Staff) by arrangement

531. Numerical Analysis/Scientific Computing Seminar
1 unit, any quarter (Stuart) M 4:15-5:30

540. Seminar on Computer Systems — (Enroll in Electrical Engineering 380.)
1 unit, Aut, Win, Spr

544. Mobile Computing Seminar — Weekly readings and informal discussions on current research in mobile and wireless computing. Students present recent papers to the group and give their opinions about research material. Invited speakers from Stanford and elsewhere lecture on topics of current interest. Prerequisites: 240B, 244B.
1-2 units, Aut (Baker) W 12-1:15

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.
1 unit, Aut, Spr (Keller) F 3:15

547. Human-Computer Interaction Seminar — Weekly speakers on topics related to human-computer interaction design.
1 unit, Aut, Win, Spr (Winograd) F 12:30-2

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.
1 unit, Spr (Staff) Th 4:15

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.
1 unit, Spr (Mitchell) by arrangement
ELECTRICAL ENGINEERING


Chair: Joseph W. Goodman
Vice Chairs: Gene F. Franklin, Robert M. Gray
Associate Chair (Admissions): R. Fabian W. Pease
Assistant Chair: Sharon A. Gerlach


Courtesy Associate Professors: Norbert Pecio; Julius Smith (Research)

Consulting Professors: Charlie C. Bass, Carl Berglund, Raymond Browning, Elizabeth Cohen, Bruce Deal, Bruce Delagi, Abbas Emami-Naeini, Joseph Feinstein, Michael Godfrey, Dale Harris, Narinder Kapany, Else Kooi, Robert L. Kosut, Franklin Kuo, David Liddle, Roger D. Melen, Madhav Narasimha, Yoshio Nishi, Sydney Parker, Raghuraghavan, B. Ramakrishna Rau, Richard Reis, Donald Scharfetter, Michael Schlanskar, Arden Sher, Thomas Sigmon, Joachim Stohr, John F. Wakerly, Martin Walt, Cindy Yuen

Consulting Associate Professors: Norman P. Jouppi, Ruby Lee, Mark Linton, Stephen Lundstrom, David Stork, Noel P. Thompson, David B. Tuckerman

Consulting Assistant Professors: Neal Bhadkamkar, Jehoshua Bruck, Burton Kalisky, Fabian Klass, Fung Fung Lee, Mehrdad Moslehi, Yi-Ching Pao, Nirmal Saxena, Yuri Taranenko, David Ungar, Daniel Weise

Visiting Professors: Marc Ilegems, Michel Marhic, Sigurd Meldal, Martin Morf, Vellenki Reddy, David Skellern; Samuel Haddad (Research)

Visiting Associate Professors: Byoung Kim, Istvan Kollar, Samiha Mourad, Belle Wei

* 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 average letter grade indicator (LGI) in courses taken for the EE depth requirement.

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 415-723-4291. Applications are submitted to and reviewed by the Department of Electrical Engineering.

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 will have completed a master's degree prior to the quarter for which they are seeking admission. 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. No time is lost in first completing the master's degree since a thesis is not required.

University regulations governing the M.S. degree are described in the "Advanced 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 letter grade indicator (LGI) 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 item 1 through item 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 course work 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.

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 "Advanced 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 advisors, 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, the student must fulfill the M.S. depth requirement, complete a total of at least 20 units of course work in electrical engineering (of which 15 units must be graded) and be approved by the department's Ph.D. Degree Committee. A letter grade indicator (LGI) of at least 3.35 on these courses is required.

**FINANCIAL ASSISTANCE**

The department annually awards a number of fellowships and teaching and research assistantships to graduate students. The fellowships are usually awarded only to first-year graduate students. Most of the 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 normally able to write their theses as an integral part of the assistantship.

Applicants for all three forms of financial assistance should obtain the necessary application forms from Graduate Admissions, the Registrar’s Office, Old Union, Stanford, CA 94305.

**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. 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
- Distributed Systems
- Hardware Verification
- Local Area Networks
- Network Interconnection Design
- 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
- CAD and Analysis of Systems
- Cryptography and Data Security
- Data Communications
- Digital Signal Processing
- Estimation Theory and Application
- Fourier and Statistical Optics
- Information and Coding Theory
- Medical Imaging and Image Processing
- Multivariable Control
- Optical Communications
- 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 Process, Device, and Equipment
- Custom Integrated Circuits for Computers and Telecommunications
- Digital Integrated Circuits
- Integrated Sensors, Transducers, 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
Fiber Optics
Free-Electron Lasers
Laser Applications in Aeronautics, Biology, Chemistry, Electronics, and Physics
Laser Devices and Laser Physics
Nonlinear Optical Devices and Materials
Optoelectronic Devices
Photoacoustic Phenomena
Pico-second Laser Pulses
Ultrafast Optics and Electronics
Semiconductor Lasers and Optoelectronic Devices

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 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 RADIOSCIENCEx
Electromagnetic Waves and Plasmas
Geomagnetically Trapped Radiation
Ionospheric and Magnetospheric Physics
Ionospheric Modification
Lightning Discharges
Planetary Exploration
Radio Wave Scattering
Remote Sensing of Atmospheres and Surfaces
Space Engineering (also see the “Space Science and Astrophysics” section of this bulletin)
Very Low Frequency Wave Propagation and Scattering

TELECOMMUNICATIONS AND SPACE INFORMATION SYSTEMS
Applied Optics and Optoelectronics
Coherent Optical Communications
Communication Channels
Digital Telephone Switching
High Performance Digital Signal Processing
Optical Fiber Communications
Optical Networks
Optoelectronic Components and Systems
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 Personal Communication Systems

COURSES
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 courses 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 graduate courses (described in the following pages) in these areas:
Computer Hardware
Computer Languages and Operating Systems
Control and Systems Engineering
Digital Communication
Electronic Circuits
Electronic Devices and Technology
Fields and Waves
UNDERGRADUATE

100. Seminar — Discussion of special topics of interest to electrical engineering undergraduates: research in EE, the department, graduate schools, career opportunities.
1 unit, Aut (Flynn) M 4:15

4 units, Aut (Hellman) MWF 9
Win (Gray) MWF 9

4 units, Spr (Hellman) MWF 9

104. Digital Signal Processing — Introduction to computer-implemented signal processing systems. Digital impulse response and transfer functions; convolution; sampling theorem; z-transforms; digital Fourier transforms; FFT algorithms; digital filter design. Prerequisite: 102.
3 units, Aut (Nishimura) MWF 11

105A. Feedback Control Design — (Enroll in Engineering 105A.)
105B. State-Space Control Design — (Enroll in Engineering 105B.)

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 (Eshleman) MWF 9

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 MOS capacitors and field-effect transistors; biasing, small-signal models, and elementary circuit applications of MOSFETs. Weekly one hour recitation session by arrangement. Prerequisite: Engineering 40. Corequisite: 101.
4 units, Aut (Plummer) MWF 9

112. Electronics II — Basic operating principles and device equations for p-n junction diodes and bipolar junction transistors. Basics of transistor amplifier design using bipolar transistors. Weekly one hour recitation session by arrangement. Prerequisites: 101, 111.
4 units, Win (Plummer) MWF 11

113. Electronic Circuits — Bipolar amplifier design including DC bias, small signal performance, multistage amplifiers, frequency response, and feedback. Design and use of bipolar operational amplifiers. Introduction to logic circuits. Prerequisites: 102, 112.
3 units, Aut (Dutton) MWF 10
Spr (Kovacs) MWF 10

121. Digital Design Laboratory — Introduction to digital circuits and their applications. Topics: measurement techniques, logic families, switching speed, Boolean algebra, state machines, computer aided design, logic simulation, digital data transmission, analog and digital converters, and digital displays. Prerequisite: Engineering 40.
3 units, Win, Spr (Gill) TTh 1:15
three-hour lab weekly by arrangement

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. Corequisite: 113.
3 units, Aut (Kovacs) TTh 9:30-10:20
Spr (Dutton) MW 3:15
three-hour lab weekly by arrangement

133. Introduction to Communications Circuits — 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 osci-
lators (VCOs). Phased-Lock Loop (PLL) techniques, characterization of key parameters and their applications, e.g., in modems. Lectures cover 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 coterminal EE students. Prerequisite: 122.

3 units, Win (Dutton) TTh 11-12:15

137. Laboratory Electronics — (Enroll in Applied Physics 207.)

138. Laboratory Electronics — (Enroll in Applied Physics 208.)

139. Design Project— Lab in which individuals or small teams design, build, and test special circuits or simple systems to provide an introduction to hands-on circuit engineering. Ideally, two students form a team and propose a project. Requirements: a report giving details of the project and test results, a presentation to the class of the design features, and the constructed (hopefully, working) project. Some funding available for project costs. Prizes for best project. Enrollment limited to 20. Prerequisites: 121, 122.

3 units, Spr (Khuri-Yakub) Th 1:15

lab by arrangement


4 units, Aut (Kino) MWF 12:50-2:05
Win (Inan) MWF 8:30-9:45


3 units, Spr (Inan) MWF 9

181. Introduction to Computer Systems and Assembly Language Programming— (Enroll in Computer Science 110.)

182. Computer Organization and Design — Basic computer organization. Computer components: memory systems including caches, computer arithmetic, processors, controllers, input/output, buses, DMA. Data formats, addressing modes, instruction sets, and microcode. Study of the design of a small computer. Prerequisites: Engineering 40, Computer Science 110. Recommended: 121 or equivalent.

4 units, Aut (Staff) TTh 9:30-10:45
Win (Staff) TTh 1:15-2:30

183. Advanced Logic Laboratory — Experiments in digital logic design using TTL integrated circuits, MSI and LSI registers and ALUs, Programmable Gate Arrays, and PLAs. Choice of projects including: various sequential machines, D/A converters and CRT displays, integrators, arithmetic processors, stored-program processors, game-playing machines. Enrollment limited to 25; preference to graduating seniors in Spring Quarter. Prerequisites: 121, 182 (may be taken concurrently).

3 units, Aut (Flynn) MWF 8
Win, Spr (Staff) MWF 8
four-hour lab by arrangement

184. Programming Paradigms— (Enroll In Computer Science 107.)

188. Concurrent Programming— (Enroll in Computer Science 140.)

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

201. Seminar — Weekly discussions of special topics of current interest in electrical engineering. Autumn Quarter: orientation to Stanford and to the EE department. Winter Quarter: prepare for life after the M.S. degree, in industry or as
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 (Saraswat) MWF 2:15

205. The Entrepreneurial Engineer — Seminar furthers the knowledge base of prospective entrepreneurs with an engineering background. Includes contributions made to the business world by engineering graduates. Speakers include Stanford (and other) engineering and M.B.A. graduates who have founded large and small companies in nearby communities. Also, contributions from EE faculty members and other departments (law, business, and industrial engineering).

1 unit, Win (Melen) T 11

206. Control System Design and Simulation — (Enroll in Engineering 206.)

209. 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 in the context of the Stanford BICMOS process. Required for 410. Prerequisite: 112 or equivalent.

3 units, Aut (Staff) TTh 1:15-2:30


3 units, Aut (Lee) MWF 10

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) MWF 2:15

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 distribution 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, alternate years, given 1995-96

218. Semi-Custom VLSI Systems — Introduction to the design, architectures, and design automation of semi-custom integrated circuits. Hands-on experience in designing and prototyping a board level system using semi-custom VLSI. Topics: semi-custom design methodology; macro library, design entry and synthesis, simulation, automated placement and routing, and testing; performance optimization for macro library-based design; packaging; architectures of sea of gates, programmable logic arrays, and FPGAs. Prerequisites: basic knowledge of digital systems, logic design at the level of 182 and CMOS circuits at the level of 112, or consent of instructor.

3 units, not given 1994-95

228. Basic Physics for Solid State Electronics — Intended as a prerequisite for graduate-level courses in physics of solid state devices. Topics: review of classical kinetic theory, introduction to statistical mechanics and to the band theory of solids. Prerequisite: Physics 57 or equivalent.

3 units, Aut (J. Harris) TTh 2:45-4

229B. Thin Film and Interface Microanalysis — (Enroll in Materials Science and Engineering 347.)

229D. Introduction to Magnetism and Magnetic Materials — (Enroll in Mechanical 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) MWF 3:15

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, Win (Siegman) MWF 9

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.)

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 laminal 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 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) MWF 11

242. Waves II — Continuation of 241, emphasizing fundamental topics for further study and application of microwave, optical, acoustic, or plasma phenomena. Plane, cylindrical, and spherical waves and boundary value problems; radiation and reciprocity; wave guides, fiber optics, and cavity resonators. Uni-axial and gyrotropic anisotropic media with magnetionic plasma, and ferrite applications. Resonators. Perturbation theories, attenuation and energy conservation. Prerequisite: 241.

3 units, Win (Kino) MWF 10

243. Integrated and Fiber Optics — Introduction to the basic operating principles and applications of the state-of-the-art integrated and fiber optics components. Topics: LiNbO3 optical switches and modulators, Si optical benches, Si micro-machined light switches and beam steering devices, semiconductor quantum well modulators, self electro-optic effect device (SEED) arrays, optical fiber lasers and etalons, and liquid crystal light valves. Analysis of optical modes and coupling between various optical guides. Applications in multi-media fiber communications, local area networks, and optical display. Prerequisite: 241.

3 units, Spr (Chang-Hasnain) TTh 2:45-4

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. Introduces current industry design problems and research results. Prerequisite: senior or graduate standing in Electrical Engineering, or consent of instructor.

3 units, Aut (Lusignan) MWF 2:15


3 units, Aut (Inan) MWF 10

ber amplifiers, travelling-wave and Fabry-Perot amplifiers. Prerequisites: 113, 142. Corequisite: 278.

3 units, Aut (Kazovsky) TTh 9:30-10:45


3 units, Aut (Yamamoto) TTh 11-12:15

249. Electromagnetic Probing of 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, including 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, alternate years, given 1995-96

250. Communications Design Seminar — Recent developments in telecommunications research, including fiber-optic networks, high-speed switching, voice and data processing, packet radio, and satellite applications. Speakers from Stanford labs and telecommunications industry.

1 unit, Aut, Spr (D. Harris) T 4:15
Win (Staff) T 4:15


3 units, Spr (Tyler) MWF 1:15

254. Principles of Radar Systems — Analysis and design, emphasizing radars as systems. Radar equa-

tion 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, alternate years, given 1995-96

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 (Gray) MWF 3:15
Win (Nishimura) TTh 2:45-4


3 units, Aut (Widrow) TTh 1:15-2:30
Spr (Meng) TTh 1:15-2:30

265. Applications of the Fast Fourier Transform (FFT) — (Enroll in Music 420.)

266. Signal Processing Methods in Musical Acoustics — (Enroll in Music 421.)

268. Introduction to Modern Optics — Geometrical optics: raymatrices, 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 1995-96

271. Introduction to VLSI Systems — For Electrical Engineering, Computer Science, and Computer Systems Engineering students with background in computers, processors, and circuits. Large scale MOS design. Topics: MOS transistors, static and dynamic MOS gates, stick diagrams, programmable logic array design, MOS circuit fabrication, design rules, resistance and capacitance extraction, power and delay estimates, scaling, MOS combinational and sequential logic design, registers and clocking
schemes, memory, data-path and control unit design. Elements of computer-aided circuit analysis and layout techniques. Prerequisites: familiarity with circuits, logic, and digital systems; 112.

3 units, Aut (Horowitz) TTh 2:45-4
Spr (Staff) MW 11-12:15

272A. Design Projects in VLSI Systems—For students with research and applications interest in VLSI systems. Working in teams of two, students complete modest-sized CMOS chip of their own design. Project includes 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. Prerequisites: 271, experience with digital design.

4 units, Win (Horowitz) TTh 1:15-2:30
lab by arrangement

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. Prerequisite: completing the 272A design project.

2 units, Spr (Horowitz) TTh 9:30-10:45
lab by arrangement

276. Introduction to Wireless Personal Communications—Frequency reuse, cellular concepts, cochannel interference. Radio propagation in and around buildings: multipath, narrow-band and wideband channels, small scale and large scale statistics, space and time signal variation. Diversity. Performance statistics: coverage, margin, digital error rates. Wide band channels: maximum rates, equalization, multi-carrier, spread spectrum. Multi-server queuing and traffic. Multiple access techniques: frequency, time and code division; statistical multiplexing and data. Duplexing: frequency and time division. Wireless system control: channel access and assignment, signal quality measures, user motion and handoff, power control. Spectrum utilization and system capacity. Fixed network issues: large-scale and small-scale mobility management, signaling, protocols, data bases. Other issues: privacy and security, frequency band choices, etc. Prerequisites: 142, 278 or equivalent, 279 or equivalent.

3 units, Spr (Cox) MWF 10

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) TTh 2:45-4
Win (Staff) MW 2:15-3:30

279. Introduction to Communication Systems—Analysis and design of communication systems; analog and digital modulation and demodulation, frequency conversion, sampling, multiplexing, noise and quantization; spectral and signal-to-noise ratio analysis. Prerequisites: 102 or 261, 278.

3 units, Win (Cox) TTh 2:45-4

280A. Biomedical Sensing and Control—Research projects in biomedical technology, sensing, signal processing, control, and computation. Previous work has produced a directional hearing aid of novel design, real-time adaptive controls for infusion of therapeutic drugs, signal processing for fetal electrocardiography, and developments for biomedical research and practice. Student teams are supervised by Electrical Engineering and Medical School faculty. New projects are selected by students and faculty. Prerequisite: senior or graduate status.

3 units, Win (Kovacs, Thompson, Widrow) by arrangement

280B. Biomedical Sensing and Control-Continuation

3 units, Spr (Kovacs, Thompson, Widrow) by arrangement

281. Microcomputer-Based System Design—Lectures on the architecture and design of microprocessor-based systems. Lab experiments use Motorola universal evaluation board. Individual design project required. Prerequisites: 121, 181, or equivalent.

3 units, Win (Peterson) TTh 9:30-10:45
lab by arrangement

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, Aut (Olukotun) TTh 1:15-2:30
Win (Staff) TTh 1:15-2:30

283. Compilers—(Enroll in Computer Science 143.)

queues. Examples from computer systems area. Prerequisite: Statistics 116.

3 units, Win (Tobagi) TTh 9:30-10:45

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.)


289. Introduction to Computer Vision — (Enroll in Computer Science 223B.)

290. Curricular Practical Training for Electrical Engineers — For EE majors who need relevant work experience as part of their program of study. Final report to the student’s adviser required.

1 unit, Aut (Gray) by arrangement

Win, Spr (Franklin) by arrangement

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) MWF 3:15


3 units, Win (da Rosa) MWF 3:15

294. Advanced Integrated Circuit Fabrication Processes — Modern MOS and bipolar devices are sensitive to fabrication techniques. How are modern devices and circuits fabricated and what future changes are likely? Advanced techniques and models of diffusion, oxidation, ion-implantation, lithography, etching, deposition, interconnections and contacts. Use of SUPREM and SPEEDIE for process modeling. MOS and bipolar process integration. Manufacturing process control. Prerequisite: 212, 216 or equivalent.

3 units, Spr (Saraswat) MW 11-12:15

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.

1 unit, Aut (Kovacs) T 4:15

Win (Wooley) T 4:15

Spr (Saraswat) T 4:15

311. Advanced Integrated Circuit Fabrication Processes — Modern MOS and bipolar devices are sensitive to fabrication techniques. How are modern devices and circuits fabricated and what future changes are likely? Advanced techniques and models of diffusion, oxidation, ion-implantation, lithography, etching, deposition, interconnections and contacts. Use of SUPREM and SPEEDIE for process modeling. MOS and bipolar process integration. Manufacturing process control. Prerequisite: 212, 216 or equivalent.

3 units, Spr (Saraswat) MW 11-12:15

312. Solid-State Sensors and Actuators — Survey of solid-state sensors and actuators focusing on use of integrated circuit fabrication technology for their realization. Categories of sensors and actuators (biological, chemical, mechanical, optical, thermal, etc.). Basic mechanisms of transduction, fabrication techniques, and relative merits of the different technologies. Micromachining techniques for monolithic integration of active circuits with sensors or actuators and directions for future research. Prerequisite: 212 or equivalent.

3 units, Win (Kovacs) MWF 1:15


3 units, Spr (Wooley) MWF 3:15


3 units, Spr (Wooley) TTh 11-12:15

316. Advanced VLSI Devices — In modern VLSI technologies, MOS and Bipolar device electrical characteristics are sensitive to structural details and therefore to fabrication techniques. How are VLSI devices and circuits fabricated and what future
changes are likely? What are the implications for device electrical performance caused by 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 (Saraswat) TTh 2:45-4

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.

3 units, Spr (Pease) MWF 8

318. Computer-Aided Design of VLSI Systems — Computer-aided synthesis of digital circuits. Analysis and design of exact and heuristic algorithms and description of current CAD tools. Topics: hardware modeling and modeling languages (e.g., VHDL, Verilog); architectural synthesis and optimization methods; (scheduling, binding, data-path and control synthesis), logic synthesis and optimization for two-level and multiple-level combinational and sequential circuits; library binding. Students should have familiarity with logic design, algorithm development, and programming.

3 units, not given 1994-95

319. Integrated Systems Laboratory — Students do a CAD project (e.g., a synthesis program for a particular VLSI design style), or a system level design project (e.g., a board level design involving semi-custom ICs). Lectures present topics related to the project area, e.g., design representation and capture, simulation and verification techniques, synthesis systems, design management methods for large scale systems. Prerequisites: 218 and 318, or consent of instructor.

3 units, not given 1994-95

322A. Basic Quantum Mechanics — Two-quarter sequence provides a firm foundation in quantum mechanics in condensed matter physics and solid-state electronics. Postulates are developed emphasizing their physical interpretation. Topics: wave mechanics, probability amplitudes, matrix mechanics, the Dirac formalism, free particles, the harmonic oscillator, angular momentum, and the hydrogen atom. Prerequisites: Physics 57 or equivalent, differential equations. Recommended: linear algebra.

3 units, alternate years, given 1995-96

322B. Basic Quantum Mechanics — Development of perturbation theory, including time-dependent perturbation and the interaction of atomic systems with radiation. Identical particles, the Pauli exclusion principle and exchange. Example application; the helium atom, covalent bonding, atomic and molecular spectra, electrons in solids, quantum well devices. Prerequisite: 322A.

3 units, alternate years, given 1995-96

325. Principles of Magnetic Recording — (Enroll in Materials Science and Engineering 348.)

328A,B. Physics of Semiconductor Devices — Physical principles that govern operation of semiconductor devices and their applications in advanced semiconductor devices. Two-quarter sequence: 328A emphasizes semiconductor physics such as quantum mechanics, energy band theory, semiconductor statistics, semiclassical transport theory, scatterings, and quantum mechanical transport theory; 328B emphasizes the applications of semiconductor physics in advanced semiconductor devices, such as heterojunction (HJ) p-n diodes, HJ-bipolar transistors, HJ-FET's electron transfer devices, and photonic devices. Examples are related to the up-to-date research carried out in lab. Prerequisites: 216, 228, and 328A (for 328B). Recommended: 238.

3 units, Win, Spr (J. Harris) MWF 3:15

329. The Electronic Structure of Surfaces and Interfaces — Basic physical concepts and phenomena for various 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. Lectures on 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 57 or equivalent; 238 or consent of instructor.

3 units, Fall (Pianetta) TTh 9:30-10:45

331. The Science of Semiconductor Interfaces — The physics and chemistry of interfaces in semiconductor device structures at an atomic level. Metal-Insular-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
332. **Semiconductor Lasers** — Overview of physical principles and characteristics of semiconductor lasers, including optical gain in bulk, quantum well, and strained quantum well materials; optical modes; characteristics and fabrication of various laser structures: broad stripe, buried heterostructure, DFB, DBR, vertical-cavity, and phase-locked arrays; dynamic behavior: gain-switching, modulation, mode-locking, and noise characteristics; laser designs for various applications. Prerequisites: 142, 216. Corequisites: 228, 231.

3 units, alternate years, given 1995-96

335. **Introduction to Information Storage Systems** — Introduction to state-of-the-art data storage technologies from a system perspective. Magnetic disk and tape recording, optical recording, and magneto-optic recording. System considerations of noises, signal-to-noise ratio, error rates, error-correction coding, and detection channels. Flash memory and holographic recording. Recommended: Materials Science and Engineering 348 or consent of instructor.

3 units, Win (Wang) TTh 9:30-10:45

338A. **Quantum Optics and Measurement** — (Enroll in Applied Physics 387.)

338B. **Mesoscopic Quantum Physics** — (Enroll in Applied Physics 388.)

344. **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 given by the professor and experts from Hewlett-Packard. (Two lectures, one lab per week.) Enrollment limited to 20. Prerequisites: good understanding of transmission lines, Smith charts.

3 units, Aut (Staff) MW 3:15-4:30
lab by arrangement

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) MWF 2:15

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) WF 11-12:15
alternate years, not given 1995-96


3 units, Win (Kazovsky) TTh 11-12:15

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, not given 1994-95

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.

1 unit, Aut (Tyler) W4:15-5:30
Win (Inan) W 4:15-5:30
Spr (Fraser-Smith) W 4:15-5:30

351. **Digital Switching in Telecommunications** — Switching fundamentals, space and time division switching, design of economical switching networks, analog and digital terminations, signaling methods and control systems, software design, network control and synchronizations, traffic analysis, circuit and packet switching, integrated voice and data networking. Prerequisite: 244.

3 units, Spr (Narasimha) WF 3:15-4:30
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, Spr (Hellwell) TTh 11-12:15 alternate years, not given 1995-96

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. Provides an understanding of typical issues, the functional areas of an enterprise, fundamental management principles, and an ability to pursue areas of interest independently. Enrollment limited to 60. Prerequisite: graduate student in Electrical Engineering or Computer Science.

3-4 units, Win (enroll in Computer Science 394)
Spr (Liddle) MF 8-9:45

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, Win (Tyler) TTh 11-12:15 alternate years, not given 1995-96

356. 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 1995-96
368. Digital Image Processing — Topics: physical descriptions of continuous images; properties of the human visual system; sampling and quantization of images; matrix representation of image forming and image processing systems; unitary transforms; image enhancement and restoration; scene matching and recognition, and applications. Demonstrations. Students write image processing algorithms. Prerequisites: 261, Statistics 116 or 278.

3 units, alternate years, given 1995-96

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. Recommended corequisite: 366.

3 units, Win (MacoVski) TTh 11-12:15

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. Recommended: 366, 369A.

3 units, Spr (Nishimura) TTh 11-12:15

370. Information Systems Seminar — Lectures/discussion of topics and research areas in information systems. Topics: communication and information theory, signal processing, systems and control, and optical information processing.

1 unit, Aut (Staff) Th 4:15-5:30
Win (Gray) Th 4:15-5:30
Spr (Hellman) Th 4:15-5:30

371. Advanced VLSI Circuit Design — Overview of important issues in high-performance digital VLSI design. Focus is on system perspectives (a fast processor, DSP, etc.), CMOS, bipolar (ECL like) and BiCMOS 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. Use of SPICE extensively. Prerequisites: 271, 313 or consent of instructor. Recommended: knowledge of C and C-shells.

3 units, Spr (Horowitz) MWF 10

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, Spr (Staff) MW 11-12:15
alternate years, not given 1995-96


3 units, Win (Widrow) TTh 1:15-2:30


3 units, Spr (Widrow) TTh 1:15-2:30


3 units, Win (Narasimha) MWF 9


3 units, Spr (Boyd) TTh 9:30-10:45
alternate years, not given 1995-96

3 units, Win (Cover) TTh 2:45-4


3 units, Spr (Cover) TTh 11-12:15 alternate years, not given 1995-96


3 units, Aut (Meng) TTh 1:15-2:30 alternate years, not given 1995-96


3 units, Win (Kailath) MW 2:15-3:30

378B. Fast Algorithms for Signal Processing — The Levinson and Schur algorithms. Maximum entropy spectral analysis. Displacement structure: adaptive lattice and transversal filters. High-resolution methods (MUSIC, ESPRIT) for sensor array processing. Applications in communications, sonar and radar, etc. Prerequisite: 378A or consent of instructor.

3 units, alternate years, given 1995-96

379A. Digital Communication I — Maximum-likelihood data detection, signaling methods and bandwidth requirements, bandpass systems and analysis, intersymbol interference and equalization methods, phase-locking, and synchronization. Prerequisites: 104, 278.

3 units, Win (Cioffi) TTh 9:30-10:45

379B. Digital Communication II — Capacity calculation, cut-off rates, Viterbi Detection, convolutional codes, trellis and lattice codes, shaping codes, encoder/decoder complexity, spread-spectrum methods. Prerequisites: 278, 379A.

3 units, Spr (Cioffi) TTh 1:15-2:30

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.

1 unit, Aut, Win, Spr (Staff) W 4:15-5:30

381. Logic Design — 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: 182 or equivalent.

3 units, Aut, Win (McCluskey) TTh 2:45-4

382. Processor Design — Basic cycle time, processor area tradeoffs, and processor design studies. Vector processors, multiple instruction issue processors and shared memory multiprocessors. Queuing analysis of memory systems and I/O systems. Prerequisite: 282 or equivalent.

3 units, Win (Flynn) MWF 10

383. Advanced Compiling Techniques — (Enroll in Computer Science 243.)

384. Computer Networks: Architectures and Protocols — Objectives of computer networks; network structure and components; switching techniques (circuit- and packet-switching); network functions; layered network architectures (the ISO reference model); data link protocols (character-oriented protocols, bit-oriented protocols, error checking, window flow control, and multi-access protocols); network control (datagrams, virtual circuits, routing, and congestion control); transport and session protocols (end-to-end communication, interconnection of networks); presentation layer protocols are cited for point-to-point, satellite, packet radio, and local area networks. Prerequisite: 240A.

3 units, Aut (Tobagi) TTh 9:30-10:45

Win (Enroll in Computer Science 244A)

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.

385A. Digital Systems Reliability Seminar — Student/faculty discussions of research problems in the

1-4 units, Aut, Win, Spr (McCluskey) M 4:15

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, Aut, Win (Flynn) W 12-2
Spr (Staff) W 12-2

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. Finite field theory. 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, Spr (Gill) MWF 2:15

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 activities may involve lab experimentation, design of devices or systems, or directed reading.  
by arrangement

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.  
by arrangement

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.  
by arrangement

392R. Japanese Manufacturing and Technology R&D — For engineers, scientists, and managers following technology and manufacturing developments in Japan. Interdisciplinary seminar. Topics: Japanese government and industry laboratory electronics technology R&D, manufacturing, management, policy, technology development projects and practices, and computing technologies. Sponsored by the U.S.-Japan Technology Management Center, speakers from industry, academia, and government in the U.S. and Japan.  
1 unit, Aut (Burmeister) Th 4:15

3 units, Win (Chang-Hasnain) TTh 2:45-4

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 (Gray) 
Win, Spr (Franklin) by arrangement

398. Principles of Experimentation for Computer Vision — (Enroll in Computer Science 328 A.)

399. Topics in Computer Vision — (Enroll in Computer Science 328B.)

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

410. Integrated Circuit Fabrication Laboratory — Enrollment preference given 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 (Staff) by arrangement

418. Design and Prototyping Languages — Introduction to current advanced CAD languages, tools, and methods aimed at the rapidly expanding field of distributed and realtime systems. Hardware and software systems modeling, designed to provide a working knowledge of some of the languages and systems in current commercial use, and emerging advanced languages and methodologies that are presently in the research and experimentation phase. Emphasizes foundational principles and theories. Prerequisites: 182, Computer Science 106A,B or Computer Science 242, or consent of instructors.  
3-4 units, alternate years, given 1995-96

428A,B. Physics of Advanced Electronic Devices — Two-quarter course for second- and third-year graduate students specializing in solid state

3 units, alternate years, given 1995-96

430. Solid State Laboratory Seminar — Research subjects of interest to the Solid State Laboratory. Topics: surfaces and interfaces, molecular beam epitaxy, novel manmade electronic structures, fine line lithography, nanofabrication, optical and opto-electronic devices, high temperature superconductors, advanced semiconductor processing, and Schottky barriers. Faculty, advanced graduate students, and invited speakers from outside the University present material for discussion.

1 unit, Aut, Win, Spr (J. Harris, Pease, Wang).
W 4:15-5:15

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 invariances, distribution functions and diffusion equation methods. Useful theorems for interpreting experimental data. Source and loss processes and the physical mechanisms responsible for producing trapped radiation at the earth and other planets. Prerequisite: 142.

3 units, alternate years, given 1995-96

478. Special Topics in Information Systems — Problems selected from recent faculty research in the areas of information systems at a level of development suitable for course presentation.

3 units, Win (Hellman) TTh 1:15-2:30
Spr (Kailath) TTh 1:15-2:30
alternate years, not given 1995-96

479. Advanced Digital Communication — Topics: coding for channels with intersymbol interference, combined equalization and coding, coding for channels with input constraints (continuous phase of M-ary signaling constraints), encoder/decoder design, line coding design and analysis, multidimensional equalization, and multi-user code design.

3 units, Aut (Cioffi) MW 3:15-4:30
alternate years, not given 1995-96


481C. Topics in Computer Graphics — (Enroll in Computer Science 348C.)

482. Advanced Computer Organization — Topics in high performance processor design focusing on advanced topics in pipelining, memory systems, and vector processors. Design project. Prerequisites: 282, 382.

3 units, Spr (Olukotun) TTh 4:15-5:30

483. Topics in Compilers — (Enroll in Computer Science 343.)

484. Computer Networks: Modeling and Analysis — Network functions, architectures, and protocols; computer traffic characterization; resource sharing; packet-switched-store-and-forward networks; delay analysis, network design and optimization including capacities assignment, routing and topological design; multi-access/broadcast protocols (used in packet-switched satellite, ground radio, and local networks); fixed assignment, adaptive strategies, stability considerations and dynamic control. Prerequisite: 284. Recommended: knowledge of 384.

3 units, Spr (Tobagi) TTh 9:30-10:45

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, alternate years, given 1995-96

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, asynchronous design, and low-power implementation. Prerequisites: 264, 271, C Programming language, and UNIX.

3 units, Win (Meng) MW 11-12:15

488. Testing Aspects of Computer Systems — Fundamental principles of testing computer systems and designing for testability. Failure and fault models. Deterministic and probabilistic techniques of test generation and testing. Techniques for testing memories and microprocessors. Design for testability. Prerequisite: 381.

3 units, Spr (McCuskey) TTh 2:45-4
alternate years, not given 1995-96


3 units, alternate years, given 1995-96
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.

ENGINEERING-ECONOMIC SYSTEMS

Emeriti (Professors): Donald A. Dunn, Willis W. Harman
Chair: James L. Sweeney
Professors: Ronald A. Howard, David G. Luenberger, William J. Perry (on leave), James L. Sweeney
Associate Professors: Samuel S. Chiu, Ross D. Shachter, Edison T. S. Tse
Professors (Research): Michael M. May, John P. Weyant
Associate Professor (Research): Michael R. Fehling
Consulting Professors: James E. Matheson, Robert R. Maxfield, Peter A. Morris, Richard D. Smallwood, D. Warner-North
Consulting Associate Professors: Charles D. Feinstein, Samuel Holtzman

GENERAL INFORMATION

GOALS

Engineering-Economic Systems (EES) is a problem solving discipline applying engineering principles to application areas beyond those traditionally considered part of engineering. EES graduates are trained to think about problems in unique ways, recognizing underlying objectives and structure in unfamiliar as well as familiar situations. This program develops the skills needed to model the economic process of an organization as a system.

Although mathematical analysis using formal models and logical representations is emphasized, analysis is complemented by careful attention to the framing of issues, formulation of problems, and implementation of results. While students (and faculty) are highly skilled in mathematics and methodology, they are motivated by applications rather than purely abstract extensions.

CAREERS IN ENGINEERING-ECONOMIC SYSTEMS

Students are prepared for a variety of professional careers in business, industry, universities, and government. Graduates have pursued careers in project management, product development, consulting, strategic planning, financial analysis, government policy analysis, and university teaching and research. Some EES graduates have started companies specializing in management and systems consulting, high technology products, software, or financial services. Other graduates have helped establish new analysis capability in existing firms or government agencies and still others have established courses similar to those of EES in other universities.

Many EES 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 program is attractive to engineering professionals because it enhances their technical training with the conceptual framework needed to analyze problems of production, investment, marketing, and strategic planning in a technical environment.

APPROACH

The basic course work is organized around a unique, coherent combination of problem solving concepts drawn from the fields of dynamics, uncertainty, optimization, economics, and decision analysis. These "portable concepts" are transferable to problems in a variety of specific areas. Students are then encouraged to broaden and enrich these skills through electives in other departments of their choice such as Business, Economics, Computer Science, Industrial Engineering, Operations Research, Mathematics, and so on.

Students benefit most from the program by acquiring first-hand experience in the capabilities of present methodology. Project courses, on-campus applied projects, and internships are available to provide this experience.

REQUIRED BACKGROUND

Students admitted for graduate study in EES must have a background of undergraduate work that indicates a level of mathematical problem-solving maturity customarily found in an undergraduate engineering or physical science program. A full year's college-level calculus course, a course in linear algebra, and several courses applying calculus would be minimal mathematical preparation. Some familiarity with formal proofs is strongly recommended. Students who are not adequately prepared should take suitable mathematics courses prior to taking the core courses. Those needing a review of linear algebra or calculus are advised to attend the two-week intensive workshop offered by the department just prior to Autumn Quarter. Undergraduate course work in economics is strongly recommended.
GRADUATE PROGRAMS

Three primary programs of study lead to the degrees of Master of Science, Engineer, and Doctor of Philosophy in Engineering-Economic Systems. In addition, the department offers a coterminous B.S./M.S. program.

Study programs should be selected to give a broad coverage as well as work in depth in one or more specific areas. The course program should include a selection of foundation material from the offerings of other departments to provide breadth.

MASTER OF SCIENCE

Department requirements for the M.S. degree provide great flexibility for meeting individual objectives. The master's degree may be viewed as a terminal degree program with a professional focus or as an exploratory vehicle to formulate and select a more advanced graduate program. Course programs are approved individually by the Engineering-Economic Systems (EES) faculty.

The M.S. degree requires a minimum of one academic year of study beyond the B.S. degree, although many students choose to enrich their program with an additional year's work. University regulations governing the M.S. are described in the "Degrees" section of this bulletin. The department requires the student to successfully complete (1) an approved M.S. program with a 3.0 letter grade indicator (LGI), (2) 45 units beyond the M.S. degree including completion of all EES core courses with a 3.0 or better LGI, (3) approval of a thesis proposal by the thesis supervisor, (4) satisfactory oral presentation of the thesis to the thesis supervisor and one other faculty member appointed by the department, and (5) completion and approval of the Engineer thesis by the thesis supervisor.

ENGINEER

Admission to the Engineer degree program must be obtained from the department. The decision of the department is based on its evaluation of the applicant's academic record, performance in independent work, and potential for advanced study. The ability of the faculty to support and supervise such study is also considered.

The degree of Engineer requires a minimum of two academic years of study beyond the B.S. degree (three full-time quarters beyond the M.S.). University regulations governing the Engineer degree are described in the "Advanced Degrees" section of this bulletin.

The department requires the student to successfully complete (1) an approved M.S. program with a 3.0 letter grade indicator (LGI), (2) 45 units beyond the M.S. degree including completion of all EES core courses with a 3.0 or better LGI, (3) approval of a thesis proposal by the thesis supervisor, (4) satisfactory oral presentation of the thesis to the thesis supervisor and one other faculty member appointed by the department, and (5) completion and approval of the Engineer thesis by the thesis supervisor.

DOCTOR OF PHILOSOPHY

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 "Advanced 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 the application for doctoral candidacy has received official department and University approval does the student become a candidate.

All students who have not already earned a master's degree must receive the M.S. in Engineering-Economic Systems as a prerequisite to candidacy for the Ph.D. Not later than the first Autumn Quarter after receiving the M.S. degree, 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) an approved program of courses, (3) a 3.5 letter grade indicator (LGI) on the core courses (see "Courses" below for a list of those meeting these requirements.), (4) an oral examination near the completion of the doctoral program, and (5) a dissertation, based on research, which must be a contribution to knowledge. The department does not have a foreign language requirement.

Ph.D. MINOR

Doctoral students throughout the University may complete a minor in Engineering-Economic Systems by taking 21 units of EES courses that include five core courses. The selection must be approved by the department adviser and by the EES academic affairs chair.

FINANCIAL ASSISTANCE AND ADMISSION

Most students in the EES doctoral program have found that, after completing the qualifying procedure, they are able to obtain financial support through a combination of research assistantships, teaching assistantships, and internships, all of
which contribute directly to their educational programs as well as provide financial support. For most students, the critical period financially is the first year and one half of graduate work, when a financial commitment of about $30,000 per year is required to cover tuition and expenses.

A limited number of fellowships for first-year students are available through the department. Two other potential sources of first-year support are research assistantships and loans. However, research assistantships are, in most cases, awarded to students who have completed the qualifying procedure.

Information about loan programs and need-based aid is 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 fellowships must be made by February 15 preceding the Autumn Quarter admission is desired and must be accompanied by a complete application for admission. (Applications not requiring financial aid 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 to the department 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 AND SYSTEM APPLICATIONS

It is important for students to receive experience in applying system concepts in at least one specific problem area. This experience can be gained through an internship, applied research projects, and special courses that concentrate on applying system concepts to specific areas. The major research programs of the department are listed below. Regular and consulting faculty active in these programs are indicated.

DECISION ANALYSIS

(Holtzman, Howard, Matheson, Shachter)

This program is dedicated to advancing the discipline of decision analysis by extending the theoretical foundations, increasing the effectiveness of practice, and expanding the field of application. 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.

Many large and important problems covering the spectrum of business, government, medicine, and law have been successfully treated by decision analysis. Applications have been made to decisions in virtually every area of human endeavor, including control of hazardous processes, research and development, business strategy, clinical medical treatment, legal settlement, and major capital investments.

The 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 program research is conducted through the Decisions and Ethics Center directed by Professor Howard. Current research areas include (1) the design of agreements to govern the actions of several participants to a venture, (2) the development of procedures for clarifying unstructured areas of concern as a first step in formulating decision problems, (3) the analysis of decisions involving risks of injury or death, (4) the use of decision analysis in medicine, and (5) the development of efficient procedures that allow the benefits of decision analysis to be applied to a broad spectrum of applications at low cost in time, money, and effort.

INTELLIGENT SYSTEMS

(Chiu, Fehling, Holtzman, Luenberger, Shachter, Tse)

The program on intelligent systems 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. Studies focus on real-world examples of organizational problem-solving in the private and public sectors such as strategic business planning, large-scale production management, supply-chain de-
sign 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 the quality of organizational problem-solving, focusing on the design, development, and evaluation of computer-based intelligent systems that aid organizational decision makers in coordinating their efforts to solve such complex problems. Topics of particular interest are the work on developing algorithms automating elements of large-scale planning processes and constructing autonomous computer agents that fully automate more routine problem-solving and coordination activities.

Research and teaching emphasize interdisciplinary approaches combining mathematical, analytic techniques from systems and decision sciences with empirical methods and models from cognitive science and social sciences, as well as computational methods from computer science and artificial intelligence.

Much of the basic and applied research in this program is conducted through the Laboratory for Intelligent Systems (LIS), directed by Professor Fehling.

ECONOMIC ANALYSIS
(Chiu, Dunn, Feinstein, Luenberger, Sweeney, Tse, Weyant)

This program includes modeling and analysis of economic entities and their interactions. Several areas, described below, have commanded particular attention.

Natural Resource and Environmental Economics — Examines the problems associated with depletable or renewable natural resources, including energy, biological, mineral, and environmental resources. Research efforts include economic responses to global greenhouse gas accumulation, analysis of water markets, and economics of depletable energy resources.

Organizational Economics — 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.

Systems Economics — A response to the growing magnitude and complexity of economic decision problems, it combines economic theory in finance, general equilibrium theory, and decision theory with the problem-solving viewpoint and techniques of systems analysis.

ENERGY MODELING ANALYSIS AND POLICY
(Huntington, Sweeney, Weyant)

Energy modeling and analysis activity centers around the Energy Modeling Forum (EMF) and the Energy, Natural Resources, and Environment Program (ENREP) of the Stanford Center for Economic Policy Research (CEPR). EMF involves the application of formal analysis in the study of energy policy issues. Sponsored by the Electric Power Research Institute, the Department of Energy, and about 15 industrial affiliates, EMF is based at Stanford with Professor Weyant as director.

Current EMF studies focus on key world oil market uncertainties, global climate change, the role of energy conservation, and energy policy in Japan.

Research sponsored by CEPR includes modeling and analysis of world oil markets, oil storage policies, and economics of alternative automotive fuels. Additional research includes regulation of public utilities, optimal stockpiling under a gaming strategy, energy, and the environment.

MATHEMATICAL SYSTEM ANALYSIS
(Chiu, Luenberger, Morris, Smallwood, Tse)

Mathematical system analysis is the development and application of those mathematical principles and techniques that help formulate and solve system problems. The field is one of great diversity, both with respect to the types of mathematics employed and in the areas of application. The Stanford program emphasizes the interaction of theory and application. Faculty and students have developed methods in (1) modern control theory, including observers, dynamic programming, optimal control techniques, adaptive methods, and descriptor-variable theory; (2) optimization, including functional analysis methods, convergence theory for mathematical programming methods, decentralization methods, and new algorithms; and (3) economics, including fixed-point methods, representation of dynamic phenomena, and investment theory.

SCIENCE AND TECHNOLOGY POLICY
(Dunn, Howard, May, North, Perry, Shachter, Sweeney, Weyant)

The science and technology policy program is concerned with the analysis of national and international policies that relate to goods and services based on new and evolving science-based technologies. It has close relationships with other
activities on campus with similar objectives, as explained below.

**Telecommunications and Information Policy** — Analyzes policies concerned with the creation, distribution, and utilization of information and communication products. Close ties with the Center for Telecommunications exist.

**National Security Policy** — Analyzes the existing international security system and alternative systems that may be established through the adoption of arms control and related international agreements. Projects are carried out in cooperation with the Center for International Security and Arms Control at Stanford. Current work includes a study of system alternatives that would be made possible by increased information exchange and improved verification of compliance with treaties.

**Energy and Environment Policy** — 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. Close ties with CEPR exist.

**Medical Policy** — Analyzes medical decision making and the implications of the application of modern decision theory to medical practice for medical policy. Close ties with the School of Medicine exist and EES students are working on projects with both EES and medical school faculty members.

**COURSES**

Core Courses:

Project Courses:
- 206, 218, 234, 235, 236, 275, 283, 286

Lecture Courses:
- 31, 155, 170, 171, 207, 208, 213, 214, 222, 228, 231C, 238, 246, 247, 255, 284, 285, 286, 287, 288

Other Courses:
- 290, 291, 292, 293, 294, 386A,B,C, 400 series

Course descriptions, organized by general subject area, are listed below.

**SYSTEMS**

**201A. Dynamic Systems** — Introduction, with emphasis on the development of a dynamic system model for familiar dynamic phenomena. Goal: to recognize and analyze dynamic phenomena in diverse situations. Concepts: formulation and analysis; state-space formulation; solutions of linear dynamic systems, equilibria, dynamic diagrams; and eigenvector analysis of linear systems, the concept of control and feedback; structural properties including controllability and observability, and linear stabilizing feedback. Dynamic programming and optimal feedback control. Prerequisite: Math. 113 or equivalent.

4 units, Win (Tse) MW 9:30-10:45

**201B. Optimal Dynamic Systems** — 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 production innovation.

3 units, Aut (Tse) MW 9:30-10:45

**207. FED: Formulation, Evaluation, and Decision for System Analysis** — Synthesis of core concepts with applications. Emphasis on model formulation, system evaluation, and application-driven development of quantitative techniques. Theory and analytical techniques introduced through formulation and analysis of case studies developed into generalized concepts. Case studies include measures of transportation risk, urban transit operational analysis, location of fire houses, ATM (automatic teller machines) transactional data analysis, capacity planning of telecommunication networks. Concepts and theory include random incidence analysis, geometric probabilities, queueing theory, location theory, and network analysis. Prerequisite: 221A or equivalent.

3 units, Spr (Chiu) MW 1:15-2:30

**208. The Art of Mathematical Modeling** — 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. Prerequisite: familiarity with calculus and probability.

3 units, Win (Smallwood, Morris, Schwartz) F 1:15-4

**ECONOMICS**

**212A. Economic Analysis** — Presents basic principles for analysis of economic problems arising in industry, individual or institutional decision making, and government. Topics: production (production functions, cost functions, duality); the behavior of the firm (perfect competition, monopoly, oligopoly, pricing policy);
212B. Economic Analysis — Continuation of 212A. Topics: market structure and industrial organization (oligopoly, strategic behavior of firms, game theoretic models); general equilibrium theory (formulation, Walras’ Law, existence, uniqueness); intertemporal equilibrium and asset markets; public goods, externalities. Emphasis is on building a framework as a basis for additional advanced economics.

3 units, Win (Staff) MW 2:45-4:15

213. Microeconomics — Microeconomics 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, welfare, uncertainty, and information emphasizing the benefit viewpoint. Prerequisite: 212A or equivalent.

3 units, Aut (Luenberger) TTh 1:15-2:30


3 units, Win (Dunn) MW 11-12:15

217. Finance and Economic Growth Theory — Key ideas in finance and economic growth for engineers. Part I, basic ideas in finance: long view of expected return, risk, and diversification comparing the U.S. and other countries’ financial markets; diversification as a minimization of risk process; market risk premium including a general equilibrium theory, the Capital Pricing Model and its application; evaluation of derived instruments (options); bond evaluation; concepts of duration and convexity, the immunization process. Part II, economic growth theory: the mechanism of economic growth as derived by the basic differential equation of positive growth theory, the equation of interest theory and its role in the intertemporal allocation of resources, an economic interpretation of optimal control theory, an assessment of growth problems and prospects under different economic systems.

3 units, Spr (Staff) MW 9-10:15

218. Economic Analysis Practice — Project course focusing on applications of economic analysis. Students in teams model/analyze an economic issue and present findings to the class. Lectures suggest project areas and methods useful for addressing problems. Potential projects for illustration: develop a forecasting model for semiconductor demand, analyze investment options by a regulated industry, develop a model to aid pricing decisions in a corporation, and analyze pollution taxes in China.

4 units, Spr (Sweeney, Huntington) MW 11-12:15

221A. Probabilistic Analysis — Applied probability with a unique perspective: probability viewed as life’s possibilities and the associated likelihood of their occurrences; 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 are emphasized. Examples from social, legal, medical, and engineering systems. Prerequisite: working knowledge of calculus.

4 units, Win (Chiu) TTh 8:15-9:30

222. Probabilistic Analysis — Continuation of 221A. Topics: limit theorems, discrete and continuous time Markov chains, renewal processes, queueing theory, and transform analysis. Emphasis on building a framework to formulate and analyze probabilistic systems.

3 units, Spr (Chiu) MW 9-10:15


3 units, Spr (Shachter) TTh 9:30-10:45

DECISION ANALYSIS

231A. Principles of Decision Analysis — Presentation of a coherent approach to decision making, using the metaphor of developing a structured conversation having desirable properties, and producing actional thought that leads to clarity of action. Instruction is Socratic, with computational issues covered in problem sessions. Emphasis is on the creation of distinctions, representation of uncertainty by probability, development of alternatives, specification of preference, and the role of these elements in creating a normative approach to decisions. Evaluates information gathering opportunities in terms of a value measure. Relevance and decision diagrams represent and clarify inference and decision. Principles are applied to decisions in business, technology, law, and medicine.

4 units, Au (Howard) TTh 11-12:15

231B. Decision Engineering — Extension of decision making from a system of thought 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 sparse 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 decision involving health and safety. Prerequisite: 231A; knowledge of probability using continuous variables (221A or equivalent may be taken concurrently).

4 units, Win (Howard) TTh 11-12:15

231C. Advanced Decision Analysis — 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: 231B.

3 units, Spr (Howard) Th 2:45-5:15

234. Intelligent Decision Systems — 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, influence diagrams, knowledge maps, preference models, pre-condition-action rules, formal decision methods, storyboarding. Other topics depending on student interests and project focus. Prerequisite: 231B. Recommended: 235/236 (may be taken concurrently).

4 units, Spr (Holtzman) F 1:15-3

235. Medical Decision Analysis — Decision analysis (DA) to assist in patient and physician decisions. Student teams analyze current clinical decision situations as a term project. Analysis teams carry out at least one full DA cycle pass, including model development, deterministic sensitivity analysis, probabilistic structuring and assessment, and model appraisal. Topics: 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 the term project. Taught simultaneously with 236. Prerequisite: 231B.

4 units, Spr (Holtzman, Matheson) MWF 3:15-4:30

236. Decision Analysis Practice — Opportunity for students trained in decision analysis (DA) theory to apply that knowledge in practice. Student teams analyze a current decision situation faced by an actual decision-maker as a term project. Analysis teams carry out at least one full DA cycle pass, including model development, deterministic sensitivity analysis, probabilistic structuring and assessment, and model appraisal. A key challenge is communicating with decision participants not trained in decision analysis. Discussions are tailored toward the term project. Decisions analyzed by students have covered a wide spectrum of decision-making arenas: the university, business, military, international relations. Grading based on the professional quality of each team's analysis and presenta-
238. The Ethical Analyst — The professional analyst who uses technical knowledge in support of any individual, organization, or government is ethically responsible for the consequences. Material sensitizes the individual to ethical issues, providing the means to form ethical judgments, and questions the desirability of physical coercion and deception as a means to reach any end. An exploration of human action and relation in society is conducted in the light of previous thought, and is used to provoke additional research on the desired form of social interactions. Attitudes toward ethical dilemmas are explored by creating an explicit personal code. Selected issues from the full range of human affairs test the student’s framework for ethical judgment.

1-4 units, Spr (Howard) T 2:45-5:15

OPTIMIZATION


4 units, Aut (Shachter) TTh 9:25-10:50


3 units, Win (Shachter) TTh 9:30-10:45

246. Investment Science — Introduction to modern quantitative investment analysis — theory and practical application. Objective is to teach how modern investment concepts can be used to evaluate and manage opportunities, structure portfolios, and use sophisticated investment products including stocks, bonds, mortgages, annuities, and options. Topics: deterministic cash flows (time-value of money, present value, internal rate of return, term structure of interest rates, bond portfolio immunization, project optimization); mean-variance theory (Markowitz model, capital asset pricing); dynamic and uncertain cash flows (stock market dynamics, options theory). Emphasis is on translating theory into actual procedures. Examples of applications for every major topic.

3 units, Win (Luenberger) TTh 1:15-2:30

SUM (Feinstein) TTh 11-12:50

247. Advanced Investment Science — Advanced topics and research in the theory and application of investment concepts. Topics: futures contracts, advanced options techniques, models and applications of stochastic interest rate processes, hedging problems, evaluation of risky projects, and optimal portfolio growth. Attention to computational issues and general theory. Teams work on independent projects that apply the course principles. Prerequisite: 246.

3 units, Spr (Luenberger) TTh 1:15-2:30

APPLICATIONS AND RESEARCH

170. The Role of Technology in National Security — (Same as Political Science 134P.) 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 issues, along with 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 policymakers. Examination of some case decisions in other countries.

3 units, Aut (May) MW 4:15-5:30

171. The Role of Technology in Policy Decisions — (Same as Political Science 136P; Science, Technology, and Society 172.) Same objectives as 170, 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) MW 4:15-5:30
206. Decision System Project Course — Examines recurring decision problems and constructs prototype decision systems to assist in their solution. Emphasis is on constructing modular systems to address real technical problems and provide insight to decision makers, using structured programming, object-oriented design, and Engineering-Economic Systems (EES) core concepts. Design and implementation focus on representation of problem structure and the nature of interactions among different subsystems. Possible generalization of tools for use in future years. Students are expected to have some computer programming experience, but no prior exposure to symbolic or object-oriented programming is assumed. Prerequisites: five EES core courses, or consent of instructor.

4 units, Sum (Shachter) TTh 9-10:50

275. Quantitative Analysis of Public Policy Decisions — Focuses on problems in public policy, including environmental quality, health care, natural resources, technology development, and transportation and communication infrastructure. Students gain experience applying quantitative analytical methods to these problems; decision-oriented, emphasizing the use of quantitative analysis. Students work in groups on a single public policy problem for the entire quarter. Each group makes a presentation and submits a paper containing recommendations for addressing the problem and describing the approach used to reach this recommendation. Project work is complemented by lectures and discussions on the analytical process, illustrated with examples from the instructor’s experience. Prerequisite: 201A, 212A, 231A, and 241A, or equivalent, or consent of the instructor.

3 units, Spr (Borison, Cohan) MW 11-12:15

283. Strategy and Planning Models — 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 on integrated utilization of modeling tools drawn from diverse methodologies and the requirements for successful application in a policy-making or corporate strategy context. The links between art, theory, and practice are emphasized. Prerequisites: 212A, 231A, and 241A, or equivalent. Recommended: some background in finance and marketing.

4 units, Spr (Weyant) MW 1:15-2:30

284. Symbolic Programming and Formal Methods for Building Intelligent Systems — Introduces programming skills and formal methods needed by those who build computer-based intelligent systems, e.g., rule-based expert systems or intelligent decision-support systems. Emphasizes symbolic programming skills and hands-on practice with basic programming concepts and methods using the LISP programming language. Introduces concepts essential to most forms of programming (procedure and data abstraction; control structures, e.g., conditional branching, loops, and recursion), and modularity via object-oriented programming techniques. Students construct and manipulate formal models of reasoning processes. Elementary propositional and predicate logic. Alternative formalisms, e.g., a modal logic of belief and temporal logic. Methods of proof in these formal systems, truth conditions for logical expressions, and the relationship between truth conditions and probability. Relationship between formal models of reasoning and symbolic computation. One lecture per week, with remaining time completing small programming projects. Recommended: experience with programming in some language.

3 units, Aut (Fehling) TTh 2:30-4

285. Problem-Solving and Intelligent Systems — Study of systems of belief and cognitive processes required for intelligent problem-solving. Emphasis on programming skills necessary for building computational systems that employ specific problem-solving strategies to carry out complex problem-solving tasks. Interdisciplinary review and comparison of important perspectives on problem solving from Artificial Intelligence (AI), theories of bounded rational decision making, and analytical methods from the systems sciences such as optimization, dynamic system modeling, and control. Topics: building data structures for representing knowledge and beliefs, qualitative models of complex domains, pattern matching and unification, inference methods based on search and logical deduction, methods for controlling the efficiency and focus of an inference process, and generic architecture of intelligent agents. Prerequisites: 221A or 241A; some experience writing programs in some dialect of LISP such as Common LISP or SCHEME. Recommended: 284.

3 units, Win (Fehling) TTh 9:15-10:45

286. Building Intelligent Systems — Review of approaches to the design of a knowledge-based system, and review of the methodology for gathering and encoding the knowledge of an expert. Applications to manufacturing and management decision making. As needed, advanced topics of computer-based intelligent problem-solving systems including computer-based planning, advanced techniques for efficient control of problem solving actions. Student teams design and implement a simple intelligent system to perform a well defined problem-solving task. Prerequisite: 285 or an equivalent introductory course in artificial intelligence.

3 units, Spr (Fehling) Th 2:15-5

287. Voluntary Social Systems — Exploration of the 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 the free market; crime and punishment; guardian-ward theory for incompetency; the state and interventionism, the hypothesis of reverse results; applications to various topics — help for the needy, victimless crimes, and environmental protection; transition strategies to a voluntary society.

1-3 units, Win (Howard) TTh 2:30-4

288. Building Core Competence in Corporations — Focuses on the competitive strength of a company in a particular industry and the fit between the unique capabilities of a company which distinguish it from others and the competitive requirements of the industry. Changing requirements in dynamic competitive environments as a result of rapid technology advancement, global economic development, changes in consumer's preference and government regulations. Uses combination of model analysis and case study to understand the match and mismatch of competence with competitive requirements. Links between EES core and the notion of core competence as a basis for corporate strategy development.

3 units, Spr (Tse) TTh 9:30-10:45

OTHER COURSES

290. Introduction to Engineering-Economic Systems — Introductory lectures by faculty and research staff describing department research programs.

1 unit, Aut (Staff) Th 4:15

291. Seminar in Engineering-Economic Systems — Lectures on research applications and recent results by EES graduates and visiting scholars.

1 unit, Win (Tse) T 4:15

292. Directed Reading and Research in Engineering-Economic Systems — Directed study and research on a subject of mutual interest to the student and staff member.

1 or more units, any quarter (Staff) by arrangement

293. Seminar in Engineering-Economic Systems — Lectures on the relationship between business and technology by guest specialists from the business and the technological communities.

1 unit, Spr (Tse) T 4:15

294. Thesis and Thesis Research — Limited to students who have established candidacy for the degree of Engineer or Ph.D. A grade of '+' indicates satisfactory work; no letter grade is assigned.

any quarter (Staff) by arrangement

386A,B,C. Intelligent Systems for Organizational Problem Solving — (Same as Civil Engineering 386A,B,C.) Advanced seminar focusing on the nature of planning and other forms of problem solving in real-world organizations in the public and private sector, and on the development of computer-based methods to support and enhance organizational problem solving. Participants review and critically discuss their own research and the latest research literature in these topic areas, focusing on relevant work from multiple disciplines including behavioral and social sciences, economics, systems and decision sciences, and computer science and Artificial Intelligence. Research subjects include organization theory, organizational design, large-scale and decentralized planning in business and public sector organizations, group and organizational decision making, team theory, coordination theory, and computer-supported cooperative work.

1-3 units, Aut, Win, Spr (Fehling, Levitt) by arrangement

400. System Research Seminar — Series; group study of an area of current system research. Topics may include areas of theory and applications, announced on a quarterly basis.

1 or more units, Aut, Win, Spr (Staff) by arrangement

401. Research on Intelligent Systems — Students and faculty discuss current research on concepts and methods for building intelligent, computer-based problem-solving systems, e.g., techniques for automated planning and reasoning about action, use of qualitative and quantitative models in diagnosis and other assessment tasks, and computational methods for use in intelligent control- and decision-systems.

1-2 units, Aut, Win, Spr (Fehling) by arrangement

455. Economic Analysis Seminar — Economic theory, analysis, and application research in progress. Highly interactive presentations, primarily given by graduate students.

1-2 units, Aut, Win, Spr (Sweeney, Huntington) by arrangement

470. Government Decision-Making in Technical Areas — 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 170 or 171.

1-2 units, Aut, Win, Spr (May) by arrangement
Emeriti: (Professors) Eugene L. Grant, Robert V. Oakford, Henry E. Riggs, David A. Thompson
Chair: James V. Jucker
Deputy Chair: Hau L. Lee
Associate Professors: Stephen R. Barley, Margaret L. Brandeau, Kathleen M. Eisenhardt
Professor (Teaching): Robert McGinn
Affiliated Faculty: David Beach (Mechanical Engineering), Robert A. Burgelman (Business), J. Michael Harrison (Business), Frederick S. Hillier (Operations Research), Charles A. Holloway (Business), James G. March (Business), David B. Montgomery (Business), Evan L. Porteus (Business), Nathan Rosenberg (Economics)
Lecturers: Thomas Byers, Thomas J. Kosnik, Michael G. Lyons, Behnam Tabrizi, Adel Turki, Marshall Turner
Visiting Associate Professor: Sultan Bhimjee

Industrial engineering is concerned with how best to organize people, information, money, and materials to produce and distribute services and products. 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, 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 technically based enterprises.

UNDERGRADUATE PROGRAM
BACHELOR OF SCIENCE

The program leading to the B.S. degree in Industrial Engineering 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, 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.

GRADUATE PROGRAMS

The Department of Industrial Engineering and Engineering Management (IEEM), in collaboration with other departments of the University, offers programs leading to the degrees of Master of Science, Engineer, and Doctor of Philosophy in Industrial Engineering and to the degree of Master of Science—Engineering: Engineering Management. The department also offers a master's degree in Manufacturing Systems Engineering in cooperation with the Department of Mechanical 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 equivalent of a bachelor's degree.

INDUSTRIAL ENGINEERING

The M.S. program is designed to provide sufficient additional skills beyond the B.S. in Industrial Engineering to better prepare students for a professional career. It is also designed to prepare students with bachelor's degrees in other engineering disciplines to learn more about production and distribution systems. A master's degree may also be used as a step toward a second advanced degree.
The detailed requirements for the M.S. degree are available from the IEEM office.

All M.S. degree programs must contain certain core courses unless the student has already had equivalent courses before entering the Industrial Engineering (IE) graduate program. Only 17 units of these core courses may be applied toward the 45 units required for the M.S. degree.

Any student admitted to graduate standing on the basis of a bachelor's degree in a field other than engineering must complete, in addition to the 45 units of work as outlined above, 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.

ENGINEERING: ENGINEERING MANAGEMENT

The M.S. degree in Engineering with a concentration in Engineering Management is designed to provide knowledge of the process of management as applied to technically based enterprises and to provide additional skills in the student's basic engineering discipline. It is intended for students with the B.S. or M.S. degree in engineering disciplines other than Industrial Engineering (those with a B.S. degree in IE should pursue their M.S. in IE or Manufacturing Systems Engineering). Students interested in Management of Construction or Civil Engineering Infrastructure should apply to the Department of Civil Engineering at Stanford.

The M.S. degree in Engineering with a concentration in Engineering Management requires 30 units of specified courses in the Management area (designed to provide core managerial skills and focused on technology management) and a coherent package of 15 additional units of course work typically in the student's technical area (beyond the previous degree level). The managerial courses include accounting, finance, general management, marketing, organizations, and production. A sample program outlining detailed requirements for the degree is available from the IEEM office.

This program should be of particular interest to Honors Cooperative students, as well as coterminous students interested in adding to their understanding of technically based enterprises.

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 Department of Mechanical Engineering and the Department of 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.

The hardware and engineering-design aspects of the program include:
- Computer-Aided Design
- Engineering Design
- Introduction to Robotics and Manipulation
- Manufacturing Engineering
- Microprocessor Applications
- Visual Thinking

The engineering management subjects include:
- Engineering Economics
- Industrial Accounting
- Inventory Control and Production Systems
- Manufacturing Strategy
- 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. A key integrating experience in the program is a year-long project course (for example, Mechanical Engineering 210) revolving around an actual engineering-design project.

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.

The detailed requirements for the M.S. in Manufacturing Systems Engineering are available from the IEEM office.

ENGINEER

The Engineer degree is designed for students desiring the maximum academic preparation for a career of professional practice in the activities and areas described previously.
The Engineer degree requires two years of academic work beyond the bachelor's degree. Normally, a program of study for the Engineer degree includes the course work required for the M.S. plus approximately 36 units of additional courses of a more advanced level and a thesis. Up to 15 units may be allowed for the thesis. The purpose of the thesis is to prove the professional competence of the candidate and not necessarily to make an original contribution to knowledge.

DOCTOR OF PHILOSOPHY

The Ph.D. degree is a research degree and 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 detailed requirements for the Ph.D. program are available from the IEEM office.

ASSISTANTSHIPS AND SCHOLARSHIPS

A limited number of fellowships and assistantships are awarded each year. Detailed information may be obtained by writing the Department of Industrial Engineering and Engineering Management. Applications for fellowships, assistantships, and scholarships should be made by February 1 preceding the start of the academic year for which the award is to be made.

COURSES

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 (Tabrizi) MW 8:30-10:20
   Spr (Eisenhardt) TTh 1:15-3:05

107. Work, Technology, and Society — 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. Focuses on the U.S. with selected key trends in foreign countries. Top-

ics: 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, the work lives of engineers in Silicon Valley, and innovative public and private policies on work.

Limited enrollment. DR:9(5)
4 units, Spr (McGinn) TTh 2:15-4:05

4 units, Win (Lee) MW 8:30-9:45

125. Manufacturing Systems Design — (Graduate students register for 225.) The concepts and techniques of designing and improving performance and productivity in systems composed of and influenced by people, organizational factors, environmental factors, and technology. Emphasis on the design of high performance manufacturing systems. Multi-disciplinary approach. Use of simulation as a tool for design evaluation. Prerequisites: 100, 121; Computer Science 106B, Operations Research 153.
5 units, Spr (Jucker) TTh 10-11:50
   Th 1:15-2:30

133. Industrial Accounting — Introduction to basic 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 user 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.
3 units, Aut (Bhimjee) TTh 2-3:15
   Sum (Bhimjee) MTWTh 8

180. Senior Project: Organizations — Restricted to IE majors in their senior year not enrolled in 183 or 186. Students participate in a major project in groups of four. Attention to problem identification and definition emphasizing synthesizing feasible solutions to real problems. Prerequisites: 100, 121, 125, 133, 235, 260, Engineering 40; Operations Research 152, 153.
4 units, Win (Staff) MW 11-12:15

183. Senior Project: Economic and Financial Analysis — Restricted to IE majors in their senior year not enrolled in either 180 or 186. Students participate in a major project, in groups of four. Attention to problem identification and definition; emphasis on search for feasible solutions to real
problems and appropriate treatment of uncertainties when relevant. Prerequisites: 100, 121, 125, 133, 235, 260; Engineering 40; Operations Research 152, 153.

4 units, Win (Staff) MW 11-12:15

186. Senior Project: Production — Restricted to IE majors in their senior year not enrolled in either 180 or 183. Students participate in a major project in groups of four. Emphasis is on problem identification and definition, applying analytic methodology obtained from previous course work, when appropriate; and on developing feasible solutions to real problems. Prerequisites: 100, 121, 125, 133, 235, 260; Engineering 40; Operations Research 152, 153.

4 units, Win (Staff) MW 11-12:15

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) by arrangement

PRIMARILY FOR GRADUATE STUDENTS

203. Organizational Behavior and Management — Organization theory; concepts and functions of management; behavior of the individual, the work group, and the organization. Emphasis is on case and related discussion. Enrollment limited to 65 graduate students per section; priority given to IEEM majors.

3 units, Aut (Tabrizi) MW 10:30-11:50

214. Quality and the Products of Technology — (Same as Mechanical Engineering 214; Science, Technology, and Society 118.) Dimensions of product quality include factors such as performance, economy, reliability and emotional response of the user, cultural consistency, craftsmanship, elegance, human fit, and compatibility with global and social constraints. What quality means in completed industrial products and what must happen in design, production, and business to achieve it. Readings, lectures, projects, papers. Not a quality assurance or control course. Enrollment limited.

4 units, Win (Adams) TTh 11-1

220. Management and Organization of Research and Development — Focuses on 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.

3 units, Win (Barley) TTh 1:15-2:30

225. Manufacturing Systems Design — (Undergraduates see 125.) The concepts and techniques of designing and improving performance and productivity in systems composed of and influenced by people, organizational factors, environmental factors, and technology. Emphasis is on the design of high-performance manufacturing systems. Multi-disciplinary approach. Use of simulation as a tool for design evaluation.

4 units, Aut (Jucker) TTh 8-10

234. Strategic Control Systems — (Same as Business 319.) How changes in markets, operations, and information technology are affecting the design of strategic control systems. Changes in manufacturing, marketing, and operations strategies induce changes in strategic planning and strategic controls. Management accounting emphasizes operational planning and control, strategic controls focus on the planning and control of strategic decisions. Emphasis on customer satisfaction, continuous improvement, external benchmarking, cost, quality, time, and innovation.

4 units, Spr (Datar) MTh 10


4 units, Aut, Win (Staff) MWF 10

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 on risk management issues in the public and private sectors. Prerequisites: Statistics 116 and Engineering 60, or equivalents.

3 units (Paté-Cornell) given 1995-96

241. Project Course in Engineering Risk Analysis — Students, individually or in groups choose, define, formulate, and resolve a real risk management problem from a local firm or institution. Oral
presentation and report required. Scope of the project to be adapted to the number of students involved. Three phases: risk assessment, risk communication, and risk management. Emphasis 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 (Pate-Cornell) given 1995-96


4 units, Aut (Staff) TTh 9:30-10:45

261. Inventory Control and Production Systems — Topics in scheduling and control of production and inventory systems. Functions of inventory, determination of order quantities and safety stocks, alternative inventory replenishment systems, item forecasting, production-inventory systems, materials requirements planning (MRP), master scheduling, operations scheduling, and Just-in-Time systems. Prerequisite: Statistics 116 or equivalent.

3 units, Win (Hausman) TTh 10-11:15

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, current industry initiatives. Recommended: 260 or 261.

3 units, Spr (Hausman, Lee) TTh 10-11:15

268. Manufacturing Strategy — For graduate students only; preference given to Manufacturing Systems Engineering students. Development and implementation of the manufacturing functional strategy. Emphasis 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) MW 8:15-9:45

269. Industrial Management — Priority given to IEEM graduate students. Introduction to marketing and management policy for industrial products. Focuses on real life industrial settings. Topics: market segmentation and selection, positioning, product design, pricing, channels of distribution, sales organization, promotion, communication, and response to competitive actions. The interaction of functional policies and overall corporate strategy is stressed. Extensive case studies.

4 units, Win (Kosnik) TTh 8-9:30


4 units, Spr (Kosnik) MW 10-11:45

271. New Enterprise Management — For students interested in starting a new business or participating in the management of a venture during its formative stages. Emphasis is on the development and evaluation of business plans to launch new enterprises. Legal, financial, and operating problems that are peculiar to new ventures. Cases used extensively, many with guest speakers from that company. Students, alone or in small groups, develop a detailed business plan for a specific new venture. Enrollment limited and at discretion of instructor.

4 units, Byers, Lyons, Turner TTh 8:15-9:45

273. Entrepreneurship in High Technology — Priority given to IEEM students, and based upon previous management training and the new venture proposed. For graduate students interested in starting their own high technology business or who may become involved with smaller firms intent upon rapid growth and those interested in consulting, venture capital, or in management of high technology ventures for large companies. One session each week is a case study discussion and analysis of a high technology venture. One session following is with an entrepreneur focusing on that issue. Student teams develop a new product and a business plan; recommendations for products are available. All functional areas of new ventures are studied. Enrollment limited to 60 graduate students.

4 units, Aut (Byers, Lyons) TTh 1:20-3:05

279. Technology and Policy in Newly-Industrializing Countries — (Same as Science, Technology, and Society 279A.) Technology is seen as the key to development and prosperity in most parts of the world. The relationship between technology and industrial development. Issues relating to building technological capability in Newly-Industrializing Countries: the concept of technology leader and technology follower environments, technology transfer, independent technical capacity, public and pri-
vate sector R&D, education and human capital for technological capability, the relationship between technology and culture, the role of small firms and new enterprises in technological capability. National technological capability is seen as the sum of all technological capabilities. These issues from a national policy perspective and from the firm-level perspective of managing the innovation process in a follower environment.

3 units, Aut (Forbes) four weeks only
MTWTh 11-12:15, plus F by arrangement

281. Management of Technology in Newly-Industrializing Countries — (Same as Science, Technology, and Society 280.) For engineering, Business, and IPS graduate students; advanced undergraduates with consent of instructor. The management of innovation is key to the success of any firm, particularly technology-based. Managing innovation is different in a technology-follower environment. Workshop examines how firms build technological capability by studying issues such as technology transfer, R&D management, incremental innovation and continuous improvement, links between firms and universities/research institutes, and the relevance of “Japanese” management to a firm in an industrializing country. Limited enrollment. Prerequisite: any one of IE 279, STS 279, STS 369, STS 169 or consent of the instructor based on substantial prior preparation. Prerequisite: one of 279, Science, Technology, and Society 279, 369, 169; or consent of the instructor based on substantial prior preparation.

3 units, Spr (Forbes) four weeks only
MW 1:15-4:05

291. Directed Study — Directed study on a subject of mutual interest to student and faculty member or curricular practical training involving a summer internship culminating in a written paper. Prerequisite: student must find a faculty sponsor.

1 or more units (Staff) by arrangement

292. Technology Management Seminar — Weekly series covering topics in technology-related fields. Topics: global business management, entrepreneurial management, venture capitalism, industry-specific technology management (computers, semiconductors, communications, defense, aerospace, biotechnology, etc.), organizational behavior, marketing issues, etc. Speakers are primarily from industry, some from academia. Enrollment during Autumn Quarter limited to Engineering Management students. Enrollment during Spring Quarter limited and at discretion of instructor. No letter grades.

1 unit, Aut, Spr (Staff) M 4:15-5:30


Aut, Win, Spr (Staff) by arrangement


Aut, Win, Spr (Staff) by arrangement

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, Spr (Eisenhardt) W 1:15-4:05

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, Win (Barley) M 2-5

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) given 1995-96

327. Field Methods for Organizational Research — (Same as Business 675.) Doctoral students only; preference given to those in Industrial Engineering and Engineering Management and Business. How to conduct, write-up, and publish field research on organizations and their members. Methods include descriptive qualitative research, inductive qualitative research, survey research, structured and unstructured observation, field stimulations, and field experiments. Reading, writing assignments, lecture, and a modest field study. Enrollment limited to 12.

4 units (Sutton) given 1995-96

340. Doctoral Seminar in Risk Analysis — Doctoral study including reading/review of the literature in the fields of engineering risk assessment and risk management. New methods and topics, empha-
sizing 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. Enrollment limited to doctoral students.

3 units (Pate'-Cornell) given 1995-96

362. Advanced Models in Production and Operations—Design and operation of production-inventory systems. Production scheduling, capacity planning, plant location, sequencing, assembly line balancing, multigoal optimization. Reading material is primarily from journal articles. Prerequisite: 260.

3 units, Win (Tang) MW 10-11:15 alternate years, not given 1995-96

363. Advanced Models for Logistics Planning—Theoretical treatment of advanced models for procurement, transportation, storage, and distribution problems in a production system. Topics: facility location and layout, routing, network flow, material handling, system design, and queuing analysis. Prerequisites: 260 or equivalent, Operations Research 153 or equivalent.

3 units, Spr (Brandeau) MW 2:15-3:30 alternate years, not given 1995-96

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 on operating characteristics, performance measures, and optimal operating and control policies. Prerequisite: Statistics 217 or equivalent.

3 units (Lee) alternate years, given 1995-96

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, Spr (Hausman) TTh 1:30-2:45 alternate years, not given 1995-96

366. Planning Models for Manufacturing Systems—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, Operations Research 152 or equivalent.

3 units (Brandeau) alternate years, given 1995-96

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) T 4:15-5:45

MATERIALS SCIENCE AND ENGINEERING


Chair: William D. Nix
Associate Chair: John C. Bravman
Associate Professors: John C. Bravman, Bruce M. Clemens
Assistant Professors: Reinhold H. Dauskardt, Shan X. Wang
Professor (Research): Robert S. Feigelson
Consulting Professors: Curtis W. Frank, Huajian Gao
Acting Assistant Professor: Todd C. Hufnagel
Senior Research Associate (Teaching): Ann Marshall

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. Coterminal 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, and transmission electron microscopy; UHV sputter deposition; vacuum annealing treatments; wet chemistry; and x-ray diffraction. The Peterson Lab is also the home base for the Center for Research on Information Storage Materials (CRISM) with corresponding facilities for magnetic measurements. The department also maintains two microcomputer clusters for its students, one with a number of Macintosh computers, and the other with four high-end DEC workstations. Both clusters are linked with the campuswide Internet and Bitnet networks.

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 Handbook. 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 department.

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 interdisciplinary 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.

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.

MASTERS OF SCIENCE

The University's basic requirements for the M.S. degree are discussed in the "Advanced 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 a Stanford degree. Substitution of courses taken for specific 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, 1994) are as follows:
1. A minimum of 30 units of MSE course work (including cross-listed work) taken for a letter grade. One unit seminars and/or M.S. research units (MSE 200) cannot be used to fulfill this requirement.

2. Lab courses MSE 161, 162, 163. 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, 201 through 209, and 251. Note: 152 is not an option for students with materials science undergraduate degrees.

4. No more than 3 units of attendance-only seminar units may be used in fulfilling the requirements for the M.S. degree.

5. Approved course electives to bring total units to 45. Of the 15 units of elective courses:
   a) Twelve of the 15 units must be taken for a letter grade.
   b) A maximum of 3 units may be seminars.
   c) A maximum of 9 units of M.S. research units (MSE 200) may be used only if writing a master's research report. However, M.S. research units and seminar units combined may not exceed 9 units.
   d) Undergraduate units may count towards fulfilling the requirements of this degree on a petition basis only. See the department Student Services Manager for more details.
   e) A maximum of 5 units may be used for a foreign language course (not including remedial English courses).
   f) No more than 3 units may come from the General Engineering courses 100 through 103 (technical writing and speaking courses).

   See master's research report below; see the department's Student Services Manager for more information and/or clarification on what constitutes an approved course.

6. A minimum letter grade indicator average (LGI) of 2.75 for course work at Stanford.

MASTERS RESEARCH REPORT

Students wishing to take this option must submit a program of study, including not more than 9 units of MSE 200, to the department for approval at least two quarters before the degree is granted. The total combined units of MSE 200 and seminars cannot exceed 9. 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. 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.

ENGINEER

The University's basic requirements for the degree of Engineer are outlined in the "Advanced 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 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 units to meet the 36-unit University minimum requirement. A letter grade indicator (LGI) average 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 faculty members, one of whom must be a member of the department, and submitted in triplicate.

DOCTOR OF PHILOSOPHY

The University's basic requirements for the Ph.D. degree are outlined in the "Advanced Degrees" section of this bulletin.

Degree requirements (for students entering after September 1, 1994) are as follows:

1. Complete the substantial equivalent of the requirements for the M.S. in Materials Science and Engineering (MSE).

2. Pass a departmental oral qualifying examination the second year after admission. An LGI of 3.25 from the nine core classes (201-209) is required for admission to the Ph.D. quali-
fying exam. Students whose LGI 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 at least 60 technical course units beyond the B.S. degree (exclusive of research units, seminars, colloquia, MSE 400 — Participation in Teaching, and so on) taken for a letter grade. The remaining 12 units may consist of seminars, technical courses taken either for a letter grade or +/NC, or foreign language courses. They may not consist of research units, remedial English courses, physical education classes, music classes, and so on. Please see the department's Student Services Manager for further clarification. The program should include the following:
   a) MSE 201 through 209 (27 units), except for students who have equivalent courses at other universities.
   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).

4. Maintain a letter grade indicator (LGI) of 3.0 for all course work taken as a graduate student at Stanford.

5. Present the result of his or her dissertation at a department seminar immediately preceding the University Oral examination.

ADVANCED SPECIALTY COURSES

Electronic Materials Processing: Elect. Engr. 212, 216, 316, 410, 412; MSE 331
Materials Characterization: Elect. Engr. 329, 331; MSE 320, 321, 322, 323, 325

COURSES

PRIMARILY FOR UNDERGRADUATES

50. Introductory Science of Materials — (Enroll in Engineering 50.)
   3 units, Win (Bravman) MWF 11
   Spr (Sinclair) MWF 11

100. Undergraduate Independent Study — Independent study in materials science under supervision of a faculty member.
   1-3 units, any quarter (Staff) by arrangement

150. Undergraduate Research — Participation in a research project.
   3-6 units, any quarter (Staff) by arrangement

151. Microstructure and Mechanical Properties — For undergraduates; see 251. Prerequisite: Engineering 50 or equivalent.
   3 units, Aut (Dauskardt) MWF 9

   3 units, Spr (Hufnagel) MWF 10

   2 units, Aut (Hufnagel) W 3:15-5

   2 units, Win (Hufnagel) W 3:15-5

163. Materials Science Lab III — 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. Prerequisite: 198/208, 151/351, or equivalent.
   2 units, Spr (Dauskardt) W 3:15-5
191. Mathematical and Computational Methods in Materials Science—For undergraduates; see 201. Prerequisite: familiarity with ordinary differential equations.
4 units, Aut (Barnett) MWF 11
and by arrangement

192. Solid State Thermodynamics—For undergraduates; see 202. Prerequisites: physical chemistry or elementary thermodynamics.
4 units, Aut (Nix, Barnett, Clemens)
TTh 10:30-11:45 and by arrangement

193. Atomic Arrangements in Solids—For undergraduates; see 203.
4 units, Aut (Bravman) MWF 10
and by arrangement

194. Phase Equilibria and Statistical Thermodynamics—For undergraduates; see 204. Prerequisite: 192.
4 units, Win (Staff) TTh 9-10:15
and by arrangement

195. Waves and Diffraction in Solids—For undergraduates; see 205. Prerequisite: 193/203 or equivalent.
4 units, Win (Clemens) MWF 9
and by arrangement

196. Imperfections in Crystalline Solids—For undergraduates; see 206. Prerequisite: 193/203.
4 units, Spr (Nix) MWF 10
and by arrangement

197. Rate Processes in Materials—For undergraduates; see 207. Prerequisites: 191/201, 192/202, and 194/204.
4 units, Spr (Clemens) MWF 9
and by arrangement

198. Mechanical Properties of Materials—For undergraduates; see 208. Prerequisites: 193/203, 196/206.
4 units, Spr (Nix) MWF 8
and by arrangement

199. Electrical and Magnetic Properties of Solids—For undergraduates; see 209. Prerequisite: 195/205 or equivalent.
4 units, Spr (Wang) TTh 10:30-11:45
and by arrangement

PRIMARILY FOR GRADUATES

200. Master’s Research—Participation in a research project.
1-15 units, any quarter (Staff) by arrangement

3 units, Aut (Barnett) MWF 11

3 units, Aut (Nix, Barnett, Clemens)
TTh 10:30-11:45

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 (Bravman) MWF 10

3 units, Win (Staff) TTh 9-10:15

3 units, Win (Staff) TTh 9-10:15

3 units, Win (Nix) MWF 10

builds on mathematical, thermodynamic, and statistical mechanical foundations in the prerequisites. Prerequisites: 191/201, 192/202, 194/204.

3 units, Spr (Clemens) MWF 9


3 units, Spr (Nix, Bravman) MWF 8

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 (Wang) TTh 10:30-11:45

230. Materials Science Colloquium
1 unit, Aut (Nix, Bravman) F 3:30
Win (Clemens, Sinclair) F 3:30
Spr (Dauskardt, Barnett) F 3:30

251. Microstructure and Mechanical Properties—Formerly 351. 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) MWF 9

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. Students register in the quarter following 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. Student is responsible for arranging own employment. Student should see department Student Services Manager before enrolling.

1 unit, any quarter (Fitzpatrick) by arrangement

300. Ph.D. Research—Participation in a research project.
1-15 units, any quarter (Staff) by arrangement


3 units (Staff) not given 1994-95

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, Win (Kelly) TTh 1:15-2:30

313. Synthesis and Processing of Ceramics—Principles and methods involved in the synthesis and processing of oxide and non-oxide ceramics. Fundamentals of compound synthesis, precursor preparation, particle size control, purification, solid and liquid phase sintering, grain growth and densification, impurity effects, and processing related defects. Traditional methods; new processing techniques, e.g., sol-gel, freeze drying, etc., for bulk and thin film preparation. Application of ceramic materials in science and technology.

3 units, Win (Feigelson) TTh 10:30-11:45


3 units, Aut (Feigelson) TTh 9-10:15

315. Polymer Physics—(Enroll in Chemical Engineering 233.)
3 units, Spr (Frank) MWF 1-2:15

316. Polymer Chemistry—(Enroll in Chemical Engineering 234.)
3 units (Frank) not given 1994-95
3 units (Sinclair) not given 1994-95

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, Win (Sinclair) TTh 3:30-4:45 alternate years, not given 1995-96

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, precipitate identification. Prerequisites: 321, consent of instructor.
3 units, Spr (Marshall) by arrangement

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) MWF 2:15

325. X-Ray Diffraction — Diffraction theory and its relationship to structural determination in solids. Focuses on applications of x-rays, but concepts can also 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, Aut (Clemens) MWF 10

326. X-Ray Diffraction Laboratory — Advanced lab for x-ray diffraction techniques. Several experiments prove concepts presented in 325 (powder diffraction-particle size and strain determination, superlattice diffraction, thin film diffraction, texture analysis, and high-temperature diffraction). X-ray facilities in department and at Center for Materials Research. Prerequisite: 325.
3 units, not given 1994-95

334. Basic Physics for Solid State Electronics — (Enroll in Electrical Engineering 228.)
3 units, Aut (J. Harris) TTh 2:45-4

335A,B. Physics of Semiconductor Devices — (Enroll in Electrical Engineering 328A,B.)
3 units, Win, Spr (J. Harris) MWF 3:15

340A,B. Basic Quantum Mechanics — (Enroll in Electrical Engineering 322A,B.)
3 units, alternate years, given 1995-96

342. The Electronic Structure of Surfaces and Interfaces — (Enroll in Electrical Engineering 329.)
3 units, Aut (Pianetta) TTh 9:30-10:45

343. The Science of Semiconductor Interfaces — (Enroll in Electrical Engineering 331.)
3 units (Helms) alternate years, given 1995-96

3 units, Spr (White) TTh 1:15-2:30

3 units, Aut (Wang) TTh 4:15-5:30

349. Introduction to Information Storage Systems — (Enroll in Electrical Engineering 335.)
3 units, Win (Wang) TTh 9:30-10:45

3 units (Barnett) alternate years, given 1995-96
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, Win (Barnett) MWF 1:15
alternate years, not given 1995-96


3 units (Nix) alternate years, given 1995-96

354. Introduction to Fracture Mechanics — (Enroll in Mechanical Engineering 240A.)
3 units (Gao) given 1995-96

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) not given 1994-95

356. Fatigue Design and Analysis — (Enroll in Mechanical Engineering 245.)
3 units, Win (Nelson) MW 2:15-3:45


3 units, Win (Dauskardt) MWF 11

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 involve the use of Mathematica™.

3 units, Spr (Barnett) MWF 11

400. Participation in Materials Science Teaching
1-3 units, Aut, Win, Spr (Staff)
by arrangement

401. Seminar in Mechanical Properties of Solids
1 unit, Aut, Win, Spr (Nix, Dauskardt, Gao)
T 4

405. Seminar in Applications of Transmission Electron Microscopy
1 unit, Aut, Win, Spr (Sinclair)
by arrangement

406. Seminar in Thin Film Science and Technology
1 unit, Aut (Clemens) W 4

407. Seminar on Magnetic Recording
1 unit, Aut, Win, Spr (White, Wang)
by arrangement

408. Seminar in Diamond Thin Films
1 unit, Aut, Win, Spr (Gur) W 12:15-1:05

MECHANICAL ENGINEERING


Chair: Ronald K. Hanson
Associate Chair of Student Services: Dennis R. Carter

Associate Chair/Space: John K. Eaton

Associate Chair/Design: Mark R. Cutkosky

Division Chairs: Craig T. Bowman (Thermosciences), Juan Simo (Applied Mechanics); (The Design Division operates without a chair.)

Laboratory Directors: David W. Beach (Program Director, Manufacturing Systems Engineering and Mechanical Engineering Student Shops), J. Edward Carryer (Smart Product Design Laboratory, Center for Design Research), Mark Cutkosky (Manufacturing Sciences Lab and Manufacturing Models Laboratory), Daniel B. Debra (Guidance and Control), John K. Eaton (Heat Transfer and Turbu-
ence Mechanics), M. Godfrey Mungal (High Temperature Gasdynamics), Parviz Moin (Center for Turbulence Research)

**Professors:** James L. Adams, David M. Barnett, Craig T. Bowman, Peter Bradshaw, Brian J. Cantwell, Dennis R. Carter, Daniel B. DeBra, John K. Eaton, Joel H. Fraziger, Ronald K. Hanson, Thomas J. R. Hughes, Charles H. Kruger, Larry J. Leifer, Parviz Moin, J. David Powell, Friedrich B. Prinz, William C. Reynolds, Bernard Roth, Juan Simo, Charles R. Steele

**Associate Professors:** Mark R. Cutkosky, Rolf A. Faste, David M. Kelley, Reginald E. Mitchell, M. Godfrey Mungal, Drew V. Nelson, Sheri D. Sheppard

**Assistant Professors:** Mark A. Cappelli, Huajian Gao, Kenneth E. Goodson, Thomas W. Kenny, Sanjiva Lele, Andrew M. Stuart

**Professor (Research):** Felix E. Zajac

**Professor (Teaching):** David W. Beach

**Courtesy Professors:** Leslie J. Dorfman, Vincent R. Hentz, George S. Springer, Robert L. Street

**Consulting Associates:** Mark Denny, Oussama Khatib, Peter M. Pinsky

**Senior Lecturer:** Craig Milroy

**Acting Assistant Professor:** J. Edward Carryer

**Consulting Professors:** Jong H. Kim, Nagi Mansour, Victor Scheinman, Chauncey Starr

**Consulting Associate Professor:** Gary Beaupre

**Consulting Assistant Professors:** Dennis Boyle, William Burnett, Marjolein Van der Meulen

**Teaching Specialist:** Francis E. Rinehart

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, and design. 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 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 three divisions: Applied Mechanics, Design, and Thermosciences. Each maintains its own labs, shops, and offices. The Applied Mechanics Division covers dynamics, experimental and computational mechanics, fluid dynamics, fracture mechanics and micromechanics, and mechanics of deformable solids.

The Design Division emphasizes design process and is specifically concerned with automatic control, biomechanics, computer-aided design, design aesthetics, design research, experimental stress analysis, fatigue and fracture mechanics, finite element analysis, human factors, kine

The Thermosciences Division offers courses and specialized work in acoustics, applied thermodynamics, combustion, computational fluid dynamics, energy systems, fluid mechanics, gas physics and chemistry, heat transfer, laser diagnostics, plasma sciences, and pollution control.

A graduate program in biomechanical engineering is offered with the participation of faculty in the Design Division, Applied Mechanics Division, Department of Biological Sciences, and the Medical School.

Many of the division faculty are involved in advanced mathematical analyses, and the department as a whole provides a number of basic and advanced courses in applied mathematics.

**FACILITIES**

The department divisions maintain modern laboratories that support undergraduate and graduate instruction and graduate research work.

In the Applied Mechanics Division, 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; fluid dynamics of liquids and gases, including geophysical and astrophysical applications; fracture and micromechanics, 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 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.

The Applied Mechanics Division has a Computational Mechanics Lab. Its facilities include a CONVEX CI superminicomputer (a vector machine with CRAY-like architecture), SUN colorgraphics workstations, a cluster of Macintosh II Apple computers, and a variety of terminals, laser printers, and hard copy devices.

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.

The division also maintains the Product Realization Laboratory, which includes machine tools, CAD/CAM, foundry, plastics facilities, welding, and wood. The shops offer tools and coaching to support prototype fabrication as an intrinsic part of the design process. The ME 210 Design Project Laboratory has facilities for CAD, assembly, and mechanical testers. Lab projects include designing composite structures, developing novel manufacturing processes, and evaluating environmental effects on composites.

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. Laboratories in biomechanical and rehabilitation engineering are available through the School of Medicine and the Palo Alto Veterans Affairs Medical Center.

The division also maintains the Product Realization Laboratory, which includes machine tools, CAD/CAM, foundry, plastics facilities, welding, and wood. The shops offer tools and coaching to support prototype fabrication as an intrinsic part of the design process. The ME 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 education. Resources include a network of high-performance CAD workstations from IBM, DEC, SUN, Silicon Graphics, and Symbolics. In addition, CDR has several industrial robots for student projects and research. These and several NC machines are part of the CDR Manufacturing Sciences Lab. The Design Division also has a unique “Product Design Loft,” in which students in the Product Design program develop graduate design projects.

Research and design/development opportunities in Rehabilitation Engineering and Biomechanics are available at the Veterans Affairs Medical Center in cooperation with the School of Medicine. The program includes graduate assistantships and is led by members of Design Division faculty. Facilities include Ethernet-connected DEC, SUN, and Silicon Graphics workstations; Apple (Macintosh) and IBM personal computers; a Symbolics Lisp machine; and a motion analysis system for collecting biomechanical and kinesiological data. Neuromuscular Biomechanics and Electrophysiology, and experimental mechanics laboratories provide research support.

The Thermosciences Division has two major labs and the Center for Turbulence Research (CTR). The Thermosciences Laboratory is equipped with representative power, fluid handling, heat and mass transfer equipment, refrigeration, and extensive special facilities for advanced graduate research in convective heat transfer and fluid mechanics, internal combustion engine research, turbulence, and other work relevant to energy systems and the environment conducted by the Heat Transfer and Turbulence Mechanics (HTTM) group. The High Temperature Gasdynamics Laboratory (HTGL) is engaged in research activities in combustion, chemistry of pollutant formation, development of laser-based diagnostics, laser chemistry and processing, plasma sciences, and reactive and nonreactive gas dynamics. The experimental capability of the HTGL includes a central laboratory computer with image processing capability, dedicated minicomputers, diagnostic devices for combustion gases and plasmas, laboratory combustors including a coal combustion facility and supersonic combustion facilities, several advanced laser systems, a variety of plasma facilities, and three shock tubes. A wide variety of instrumentation, extensive shop facilities, research space, and utilities are all available within, and shared by, the lab. CTR has direct access to the major computing facilities of NASA-Ames Research Center. Together with others working in computational fluid mechanics, this group uses NASA’s CRAY-YMP, CRAY-2, and massively parallel supercomputers. CTR is also equipped with several powerful graphics workstations.

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 superminicomputers. 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 departmental 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 General 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. Courses taken for the departmental major (math; science; Science, Technology, and Society; engineering fundamentals; and engineering depth) must be taken for a letter grade if the instructor offers the option. An individually designed major in Biomechanical Engineering (B.S.E.: Biomechanical Engineering) is offered and may be appropriate for some students preparing for medical school or graduate bioengineering studies. Information and course suggestions are available from the ME Student Services office.

Grade Requirements — To be recommended by the department for a B.S. in Mechanical Engineering, a student must achieve the minimum letter grade indicator (LGI) set by the School of Engineering (2.0 in engineering fundamentals and engineering depth).

COTERMINAL B.S./M.S. PROGRAM

Stanford undergraduates who wish to continue their studies for the Master of Science degree in the coterminous program should apply for entrance after the beginning of the eighth quarter of undergraduate work and before the end of the 11th quarter. The application must provide evidence of potential for strong academic performance as a graduate student. The application is evaluated and acted on by the graduate admissions committee of the department. Typically, an LGI of at least 3.25 in engineering, science, and math is expected. Applicants must have completed two of 111, 112, 113, 131A, 131B, 131C and must take the Graduate Record Examination (GRE) before action is taken on the application. Coterminous information and forms can be obtained from the ME Student Services office.

GRADUATE PROGRAMS

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.

Admission and Registration — The basic University requirements for the master’s degree are discussed in the “Advanced Degrees” section of this bulletin.

To be eligible for registration as a graduate student in the department, a student must have a B.S. degree in engineering, physics, or a comparable science program. The student’s undergraduate record and personal recommendations must demonstrate the capability of handling graduate-level work and of completing the requirements for the M.S. 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.

Graduate Program — Mechanical engineering is a varied profession, ranging from primarily aesthetic aspects of design to highly technical scientific research. Discipline areas of interest to mechanical engineers include biomechanics, energy conversion, fluid mechanics, materials, nuclear reactor engineering, propulsion, rigid and elastic body mechanics, systems engineering, 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.

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 master's year may participate in research through ME 290, 291, and ME master's year may participate in research through ME 290-299 or other seminars. Students planning a Ph.D. degree should discuss with their adviser the desirability of taking 291 or 292 during the master's year.

1. Mathematical Competence in Two of the Following Areas: partial differential equations, linear algebra, complex variables, numerical analysis, modern algebra, vector and tensor analysis, or statistics, as demonstrated by completion of two courses from ME 201-208; Math. 106, 109, 113, 120, 131, 132; Computer Science 137, 237A,B,C; Statistics 110, 161. (Requirement: 6 units.) Students who completed comparable graduate-level courses as undergraduates and who can demonstrate their competence to instructors may be exempted from this requirement by their advisers and the ME Student Services office and place the units in the approved elective category.

2. 18 units of graduate-level courses in ME consisting of:
   a) A Specialty in Mechanical Engineering: a set of graduate-level courses in mechanical engineering to provide depth in one area. These sets have been approved by the faculty as providing depth in specific areas as well as a significant component of applications of the material in the context of engineering synthesis. The currently approved depth packages involve three to four courses.
   b) Breadth in Mechanical Engineering: additional graduate-level courses in mechanical engineering to bring the total number to at least 18 ME units in courses numbered 210 and above, excluding 290-301 and math courses. Of these additional courses, at least one each must be in two independent subject areas that add breadth to the program.

3. Approved Electives (to bring the total number of units to 39): all these units must have adviser approval. Graduate engineering, math, and science courses are normally approved, and upper-level undergraduate courses may be approved if consistent with the student's objectives. Of the 39 units, no more than 6 may come from ME 291 and 292, and no more than 3 may come from the other courses numbered 290-299 or other seminars. Students planning a Ph.D. degree should discuss with their adviser the desirability of taking 291 or 292 during the master's year.

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 210C, 218A, 226A, 248, 249, 254, 267, 268, 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 letter grade indicator (LGI) of 2.75 in the 45 units presented in fulfillment of degree requirements. All courses used to fulfill requirements 1, 2, 3, and 5 must be graded (excluding seminars and courses for which a Satisfactory/No Credit grade is given to all students).

Students falling below an LGI of 2.50 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.
ford’s B.S. in Product Design spend an additional year taking prerequisite undergraduate and product design courses. The requirements for this degree are:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Art 360A,B,C. Master’s Project</td>
<td>6</td>
</tr>
<tr>
<td>*ME 211A,B,C. Master’s Project</td>
<td>12</td>
</tr>
<tr>
<td>ME 221. Human Factors</td>
<td>3</td>
</tr>
<tr>
<td>ME 313. Ambidextrous Thinking</td>
<td>3</td>
</tr>
<tr>
<td>†Approved Electives</td>
<td>15</td>
</tr>
<tr>
<td>Free Electives</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
</tr>
</tbody>
</table>

* 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.

**GRADUATE DESIGN OPTIONS**

**Biomedical Design**
- ME 280. Biomechanical Engineering Seminar
- ME 281A,B,C. Musculoskeletal Biomechanics (restricted enrollment)

**Design Management**
- Ind. Engr. 133. Industrial Accounting
- Ind. Engr. 269. Industrial Marketing
- Ind. Engr. 271. New Enterprise Management
- Ind. Engr. 272. Managing Small Technical Companies

**Design Philosophy**
- ME 215. The Designer in Society

**Engineering Design**
- ME 210A,B,C. Mechatronic Systems 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 LGI 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 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. Mechatronic Systems Design
- ME 218A,B,C. Smart Product Design
- ME 313. Ambidextrous Thinking
- ME 319. Robotics and Vision

The engineering management subjects include:
- Ind. Engr. 121. Statistics and Quality Control
- Ind. Engr. 203. Organization Behavior and Management
- Ind. Engr. 261. Inventory Control and Production Systems
- Ind. 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 LGI of 3.00 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. The Dual M.S.E./M.B.A. requires separate applications to each program. Minimum requirements can be met through seven quarters of study if the candidate matriculates to both programs simultaneously. For additional information, contact ME Student Services.
BIOMECHANICAL ENGINEERING

Students interested in graduate studies in biomechanical engineering can choose one of the programs below. Admission and program requirements for both degrees are:

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.)**: admission to this program requires a separate admissions evaluation process. Prospective students who wish to pursue this degree should apply directly to this program. Instructions for admission are described in the Mechanical Engineering graduate application packet.

The Biomechanical Engineering program allows students more flexibility in taking courses in the life sciences and generally emphasizes a more interdisciplinary curriculum. Minimum graduation LGI 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. In extraordinary circumstances, a student may design an interdisciplinary Ph.D. degree to be pursued through Graduate Special Program. See the “Graduate Special Program” section of this bulletin.

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 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 290-292. 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. Students anticipating working for a post-master’s degree should arrange to do some research work under ME 291 or 292 prior to attempting to make a supervision arrangement. Faculty members supervising post-master’s research generally require some evidence that a student has research potential before committing themselves 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. A student who has not arranged for faculty supervision must petition for registration after completing 45 units of graduate work at Stanford.

The basic University requirements for the degree of Engineer are discussed in the “Advanced 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 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 is 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 ap-
proval 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 letter grade indicator (LGI) 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 “Advanced 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 three divisions of the department. Information may be obtained from the division or department offices.

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 letter grade indicator (LGI) equivalent of at least 3.25. Courses used in the LGI evaluation are the same as those that would be used to meet the M.S. LGI requirement. Students entering Stanford with an M.S. from another school must have a 3.25 LGI 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 LGI 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 "Advanced 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 departmental administrative assistant.

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. in Biomechanical Engineering, or a comparable master's degree. Students must pass the Department of Mechanical Engineering Ph.D. qualifying exami-
COURSES
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.

30. Engineering Thermodynamics — (Enroll in Engineering 30.)


4 units, Win (Cappelli) MWF 11
Spr (Mungal) MWF 11
lab MTWTh 1:15-3:05 or 3:15-5:05,
or a two-hour lab by arrangement

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. Enrollment limited to 20. Prerequisite: keen sense of curiosity.

3 units, Aut (Staff) MWF 1:15-3:05
lab TTh 3:15-5:05
Spr (Staff) MWF 1:15-3:05


3 units, Spr (Ferziger) MWF 11

101. Visual Thinking — Visual thinking and language skill 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. Relation of visual thinking to the creative process. Emphasis on fluent and flexible idea production. Enrollment limited to 60.

3 units, Aut (Staff) lec/lab MW 1:15-3:05
Win (Staff) lec/lab TTh 3:15-5:05
Spr (Staff) lec/lab MW 3:15-5:05

103. Manufacturing and Design — (Graduate students register for 303.) Emphasis 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. Recommended: 101, Engineering 11.

4 units, Aut, Win (Beach) TTh 9-10:50
lab by arrangement

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. No prior knowledge of drafting required.

1 unit, Aut, Win (Milroy) one meeting per week
by arrangement, sec. 1 T 7:30-9:30 p.m.,
sec. 2 W 3:30-5:30

104. Dynamic Response — (Enroll in Engineering 104.)

105A. Feedback Control Design — (Enroll in Engineering 105A.)

105B. State-Space Control Design — (Enroll in Engineering 105B.)

111. Stress, Strain, and Strength — Review of free body diagram analysis and basic elastic stress analysis. 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. Prerequisites: Engineering 10 and 11.

3 units, Aut (Staff) MW 1:15-2:40
112. Mechanical Systems — Emphasizes functional aspects of the design process. Applications of basic principles and empirical relationships in the evolution from conceptual design to detailed specification of critical components. Individual and group design projects apply principles to develop a mechanical system to meet specified functional goals. Co- or prerequisites: 103, 111.

3 units, Win (Staff) TTh 1:15-2:40

113. Engineering Design — Application of information from various sources to create designs and models of new mechanical devices. Design is studied as a process, and experienced by students as they work on a team design project. Final project results are presented to a professional jury. Prerequisites: 101, 103, 111, 112.

3 units, Spr (Staff) TTh 2:15-5:05

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 (Kelley) MW 1:15-3:05 one evening lab by arrangement

115B. Expression of Function — Numerous tightly constrained 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 (Kelley) MW 1:15-3:05

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) W 7:30-10 p.m.

116A. Advanced Product Design — Small-scale projects carried to a high degree of refinement. Emphasis is on craftsmanship and aesthetics. Prerequisites: 115B, Art 160.

3 units, Aut (Kelley) TTh 9-11

116B. Advanced Product Design — The perception and engagement of human needs in design. Societal trends, current affairs, and personal values as sources for design inspiration. Students identify potential design projects for 116C, 211, and beyond.

3 units, Win (Faste, Turnbull) TTh 11-1:05

116C. Advanced Product Design — Summary project utilizing knowledge, methodology, and skills obtained in 101, 103, 115A,B, and 116A,B. Final presentation to professional jury. Prerequisite: 116B.

3 units, Spr (Staff) TTh 11-1:05

116D. Advanced Design Sketching — Freehand 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.

1 unit, Aut (Staff) W 7:30 p.m.

117. An Introduction to Sensor — (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.

4 units, Aut, Spr (Kenny) MW 9-10-50 TTh 11-12:50

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 consisting of structural assignments and open-ended team project. Limited enrollment. Prerequisites: Engineering 40, Computer Science 106, or equivalent.

4 units, Win (Carryer) MW 1:15-3:05

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 the “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 (DeBra, Beach) TTh 9-10:50

130. Internal Combustion Engines — Internal combustion engines including conventional and turbo-charged spark ignition engines, diesel, and gas turbine 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. Pre-
MECHANICAL ENGINEERING

requisite: Engineering 30, 131A (or concurrent enrollment in 131A), or equivalent.

3 units, Aut (Rinehart) MW 9
lab by arrangement

131A. Heat Transfer — 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.

3 units, Aut (Cappelli) MWF 10
lab one afternoon by arrangement

131B. Fluid Mechanics — Continuation of 131A.

3 units, Win (Lele) MWF 10

131C. Thermodynamics — Continuation of 131B.

3 units, Spr (Mitchell) MWF 11

132. Thermosciences Laboratory — Demonstrates the utility of experimentation in thermosciences and introduces modern lab techniques, e.g., A/D converters for digital data acquisition. Two introductory experiments are selected from vehicle aerodynamics, compressible fluid flow, and turbomachinery. Major experiment involves an internal combustion engine. Communication of results in written and oral reports and evaluation of data using formal methods of uncertainty analysis emphasized. Enrollment limited to 30 preregistered students. Prerequisites: 33, 131A, and Engineering 30.

3 units, Win, Spr (Rinehart) lec T 9
lab four hours weekly by arrangement

138. Noise Pollution — (Enroll in Aeronautics and Astronautics 138.)

161. Dynamic Systems Design

4 units, Aut (Staff) TTh 1:15

191. Engineering Problems and Experimental Investigation — Directed study and research for the undergraduate 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) by arrangement

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, approved electives.

103. Manufacturing and Design

105A. Feedback Control Design — (Enroll in Engineering 105A)

105B. State-Space Design — (Enroll in Engineering 105B)

113. Engineering Design

138. Noise Pollution — (Enroll in Aeronautics and Astronautics 138)

161. Dynamic Systems Design

255. Gasdynamics

250. Introduction to Heat Transfer

PRIMARILY FOR GRADUATES

ENGINEERING MATHEMATICS

201A,B,C are intended for students in the master's program with a minimum 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 Math. 131, and Computer Science 137.


3 units, Aut (Ferziger) MWF 11


3 units, Aut (Ferziger) MWF 11


3 units, Win (Moin) MW 11-12:15

201C. Mathematical Methods in Mechanical Engineering—Geometric interpretation of partial differential equations (PDEs), characteristics, solution of first order equations, characteristics and classification of second order PDEs, separation of variables, special functions, eigenfunction expansions, Fourier integrals and transforms, Laplace transforms, method of characteristics, analytic and numerical techniques, self-similarity. Prerequisites: 201A,B.

3 units, Spr (Stuart) MWF 9


205A. 3 units, Aut (Hassell) TTh 9:30-10:45
205B. 3 units, Win (Kuske) TTh 9:30-10:45
205C. 3 units, Spr (B. Zhang) TTh 9:30-10:45

206. Similitude in Engineering Mechanics — (Enroll in Aeronautics and Astronautics 218.)

207. Perturbation Methods in Engineering Mechanics—Examples of perturbation solutions in fluid mechanics, solid mechanics, dynamics, and other fields; asymptotic expansions; series and iteration schemes; regular perturbations; computer-extended series; slow variations; singular perturbation problems; the methods of matched asymptotic expansions, multiple scales, and others; improvement of series. Prerequisite: 201B or Math. 131, or consent of instructor.

3 units, Spr (Van Dyke) MW 10-11

208. Vector and Tensor Analysis — (Enroll in Aeronautics and Astronautics 192.)

DESIGN AND CONTROLS

209. Aesthetics of Machinery — Effects of design strategy selection, design media, construction and assembly strategies, human factors, and explicit or intuitive personal criteria on the appearance of machinery and designed objects. Students explore these issues and develop an awareness of their personal design style through design and construction of small-scale mechanical devices. Enrollment limited to 15; consent of instructor required.

1-3 units (Faste) given 1995-96

210A. Mechatronic Systems Design and Methodology: Framework—Industry-sponsored projects develop the graduate engineer’s knowledge of and skill at applying structured concurrent engineering design methodology. Corporate representatives deliver project specific technology while the teaching team focuses on methodology. Three short design exercises sharpen methods awareness and develop team design skills in preparation for the sponsored project. Following project selection, the design team refines the problem statement; develops detailed functional, physical, and user requirements; and identifies design approach alternatives, supported by a design coach, corporate liaison, and faculty advisers. Project content may include: mechanism design, automation design, manufacturing process design, consumer product, and biomedical device design. Three quarter series. Students may take 210A only. Enrollment limited to 45.

4 units, Aut (Leifer) TTh 3:15-5:05

210B. Mechatronic Systems Design and Methodology: Rapid Prototyping — Continuation of 210A. Design alternatives are subjected to rigorous examination by rapid prototyping and design trade-off analysis. Emphasis is on design for manufacturability, assembly, test, service, cost, and human factors. Incremental test/assessment development cycles are supported by the design lab’s CAD, simulation, and modeling and internet services facilities. Enrollment limited to 45.

4 units, Win (Leifer) TTh 3:15-5:05

210C. Mechatronic Systems Design and Methodology: Functional Assessment—Continuation of 210B. One or more leading design alternatives are developed into full-scale functional product prototypes. Emphasis on oral and written presentation skills. Final designs and function prototypes are presented to corporate sponsors at the Design Affiliates Conference the first week in June. Enrollment limited to 45.

4 units, Spr (Leifer) TTh 3:15-5:05

211A,B,C. Product Design Master’s Project—For Product Design or Design (Art) majors only. Three-quarter graduate design projects taught jointly with Department of Art faculty. Entails identifying and engaging needs, exploration of design in two and three dimensions, construction of working prototypes that synthesize human, aesthetic, and tech-
211A. 4 units, Aut (Faste, Kelley) T 7-10 p.m.
211B. 4 units, Win (Faste, Kelley) T 7-10 p.m.
211C. 4 units, Spr (Faste, Kelley) T 7-10 p.m.

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 Apple computer supported tools in the design process. Student and instructor presentations of work in progress. Coaching in project development is available from instructors during Autumn and Winter Quarters.

3 units, Spr (Milroy, Woolsworth) MW 10

214. Quality and the Products of Technology — (Same as Industrial Engineering 214; Science, Technology, and Society 118.) Dimensions of product quality including factors such as performance, economy, reliability and emotional response of the user, cultural consistency, craftsmanship, elegance, human fit, and compatibility with global and social constraints. What quality means in completed industrial products and what must happen in design, production, and business to achieve it. Readings, lectures, projects, papers. Not a quality assurance or management course. Prerequisite: Art 360.

4 units, Win (Adams) TTh 11-1

215. The Designer in Society — Open to graduate students from all disciplines. 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 20.

4 units, Win (Roth) W 1:15-4:05

216. Introduction to Aircraft Design Synthesis and Analysis — (Enroll in Aeronautics and Astronautics 241A.)

217A. Design for Manufacturability: Methodology — Structured methodologies of the DFM design process. Topics: national issues in DFM, structured design and simultaneous engineering, design for assembly, value engineering, quality function deployment, design for process, tolerances and six sigma concepts, statistical process control, Taguchi's loss function, parameter design and design of experiments, robust design.

4 units, Aut (Ishi) TTh 8-9:15

217B. Design for Manufacturability: Projects — Application of DFM principles by small project teams to an original problem. Lectures coordinated with project effort cover voice of customer, product definition simultaneous engineering, and time-related issues. QDD, TQM, Pugh concept selection, manufacturing process, selection, flexible product design and product line structuring, prototyping, accelerated testing, application of robust design and process, cost driver accounting.

4 units, Win (Ishi) TTh 8-9:15

217C. Manufacturing Systems and Design — (Enroll in Industrial Engineering 225.)

218A. Smart Product Design Fundamentals — Topics: basic digital and analog circuits, boolean algebra, logic, clocked circuits, encoders/decoders, microprocessor architecture, serial input/output, FORTH high-level language prototype programming, and "C" high-level language production programming. Enrollment in 218B,C is contingent on completing 218A or passing a Smart Product Design Fundamentals proficiency examination given at the beginning of Autumn Quarter. Lab fee.

4 units, Aut (Carryer) TTh 11:15-1:05

218B. Smart Product Design Applications — Laboratory design problem lecture series deals with programmable electromechanical systems design methodology. Fundamentals and advanced topics are introduced in the context of lab assignments and projects. Topics: advanced digital and analog circuits, signal conditioning and analysis, software requirements for embedded systems, sensors, actuators, and real-time operating systems. Prerequisite: passing of the Smart Product Design Fundamentals proficiency examination.

4 units, Win (Carryer) TTh 1:15-3:30

218C. Smart Product Design Practice — Project-driven lecture and case study deals with advanced design and the development of real smart-product prototypes. Student teams carry design from concept to functional prototypes. Continuing review of advanced technology issues. Smart Product Design Management topics: product specification, development environment selection, design team management, scheduling, and documentation design.

4 units, Spr (Carryer) TTh 1:15-3:15

219. Introduction to Robotics — (Enroll in Computer Science 223A.)

220. Introduction to Sensors — See 117.

222. Kinematic Synthesis of Mechanisms — The rational design of linkages. The problem of determining linkage proportions to fulfill various design requirements is treated analytically. Topics: three- and two-dimensional displacements and motions, the theory of higher plane curves, higher-order path-curvature analysis, circle and center-point theory.

3 units, Win (Roth) WF 11-12:15
225A. Control System Design and Simulation—(Enroll in Engineering 206.)
225B. Nonlinear Control—(Enroll in Engineering 209.)
226A. Digital Control Design—(Enroll in Engineering 207A.)
226B. State-Space Digital Control Design—(Enroll in Engineering 207B.)
226C. Optimal Control and Estimation—(Enroll in Engineering 207C.)
227A. Optimal Control of Dynamic Systems—(Enroll in Aeronautics and Astronautics 278A.)
229. Fluid Power Control—Hydraulic components and systems. Valves, fluid transmission lines, actuators, fluids, power supplies. Compressibility, leakage. System modeling, stability, compensation. Examples from machine tools, industrial and aerospace applications. Prerequisite: Engineering 105. 3 units, Spr (DeBra) by arrangement

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, Aut (Roth) MW 2:15-3:30
233A. Dynamical Systems—Dynamical systems are governed by mappings or ordinary differential equations and 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 illustrated with examples from mechanics. Prerequisites: Math. 130, consent of instructor. 3 units, Win (Stuart) TTh 9:30-10:45
233B. Numerical Analysis of Dynamic 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, Spr (Staff) TTh 9:30-10:45
234A. Finite Element Methods in Fluid Mechanics—Finite element methods for basic classes of problems in fluid mechanics. Convective-diffusive equations. Mixed and penalty methods for incompressible viscous flows. Shock capturing schemes for compressible Euler and Navier-Stokes equations. Comparisons with finite difference methods. 3 units, Aut (Hughes) TTh 2:45-4
234B. Finite Element Methods in Fluid Mechanics—Continuation of 234A. 3 units, Win (Hughes) TTh 2:45-4
234C. Finite Element Methods in Fluid Mechanics—Continuation of 234B. 3 units, Spr (Hughes) TTh 2:45-4
235A. Finite Element Analysis—Emphasis 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. Compacted 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 (Simo) given 1995-96
Architecture of computer codes for nonlinear finite element analysis. Applications from structural and solid mechanics, e.g., nonlinear elasticity, plasticity, viscoplastcity, nonlinear structural models, material and geometric nonlinearities, postbuckling.

3 units (Simo) given 1995-96

236. Wave Propagation — (Same as Math. 274.)
Basic concept, waves, wavefronts, rays, phase functions, amplitude functions, ray equations, eikonal equations, transport equations, reflection coefficients, transmission coefficients, edge diffraction coefficients, surface diffraction coefficients, asymptotic expansions, wave equations. Applications to electromagnetic, acoustic, elastic, and other types of waves.

3 units, Aut (Keller) TTh 9:30-10:45

237. Free and Forced Motion of Structures — (Enroll in Aeronautics and Astronautics 244A.)

238A. Introduction to Continuum Mechanics — Basic kinematics of continuum deformation. Stress, strain, strain rate, and constitutive relations. Thermodynamics and energy principles. Applications to deformation of solids and fluids. Prerequisites: Engineering 11, Math. 130, or equivalent.

3 units, Aut (Gao) MWF 10

238B. Theory of Elasticity — Continuation of 238A.

3 units, Win (Gao) MWF 10

238C. Boundary Integral Methods — Integral equation methods for numerically solving problems in elasticity and fracture. Prerequisite: 238B.

3 units, Spr (Simo) TTh 9:30-10:45


3 units, Win (Simo) TTh 9:30-10:45


3 units, Spr (Simo) TTh 9:30-10:45


3 units (Simo) given 1995-96

240A. Introduction to Fracture Mechanics — Linear and non-linear analysis of crack-tip stress fields; energy concepts and crack growth criteria; conservation integrals; fracture behaviors under small scale or large scale plastic yielding; aspects of fatigue, dynamic fracture, and micromechanisms of fracture. Prerequisite: 238A or equivalent.

3 units (Gao) given 1995-96

240B. Advanced Fracture Mechanics — Continuation of 240A. Three-dimensional crack analysis, interfacial cracks, viscoelastic crack analysis, numerical methods in fracture mechanics, and crack interactions with other material defects such as dislocations and inclusions. Applications of fracture mechanics to composite materials. Prerequisite: 240A.

3 units (Gao) given 1995-96

241A. Theory of Plates — Analysis of stress, deformation in plates bent by transverse loads. Applica-
tions to circular, rectangular, other shapes. Vibrations, buckling. Prerequisite: 111 or Civil Engineering 114.

3 units, Aut (Steele) MWF 1:15

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.” Membrane theory for general surfaces; hyperbolic paraboloids. Prerequisite: 111 or Civil Engineering 114.

3 units, Win (Steele) MWF 1:15


3 units, given 1995-96


3 units, Spr (Steele) TTh 1:15

242. Classical Dynamics — (Enroll in Aeronautics and Astronautics 242.)


3 units, Win (Nelson) MWF 2:15-3:45

247A. Microstructure and Mechanical Properties — (Enroll in Materials Science and Engineering 351.)

248. Introduction to Experimental Mechanics — 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. Prerequisite: 201A or equivalent.

3 units, Spr (Nelson) M 2:15-5:05
plus lab by arrangement

249. Experimentation in Aeronautics and Astronautics — (Enroll in Aeronautics and Astronautics 131.)

HEAT TRANSFER, FLUID MECHANICS, AND HIGH TEMPERATURE GAS DYNAMICS


3 units, Aut (Goodson) TTh 2:15

251A. Fluid Mechanics — Exact and approximate analysis of fluid flow covering kinematics, global and differential equations of mass-conservation, momentum, and energy. Forces and stresses in fluids. Euler’s equations and the Bernoulli Theorem are generated for, and applied to, inviscid flows. Flows of simple viscous fluids using the Navier-Stokes equations. Boundary layer (thin shear) layer approximation. Solutions for some flows obtained by analytical and numerical methods examined. Prerequisite: graduate standing.

3 units, Aut (Eaton) MWF 8

251B. Fluid Mechanics — Laminar and turbulent flow, emphasizing thin shear layers and introducing inviscid, irrotational flows. Topics: exact solutions for viscous flows; creeping flow. Boundary layer separation, boundary layer stability, transition to turbulence. Reynolds averaged Navier-Stokes equations. Introduction to bounded and free turbulent shear layers and some approximate methods of
solution. Conditions for irrotational flow; stream function and velocity potential in exact and approximate solutions, superposition of solutions, complex potential function, circulation and lift. Examples from internal flows including ducts, nozzles, diffusers, and turbomachinery blading. Prerequisite: 251 A.

3 units, Win (Eaton) MWF 11

252A. Convective Heat and Mass Transfer — Prediction of heat and mass transfer rates based on analytical or numerical solutions of the governing differential equations. Current theories compared with current experimental results. Fully developed and entrance region channel flow situations in laminar and turbulent flow. Superposition methods for dealing with non-uniform wall temperature or heat release. Laminar and turbulent boundary layer heat transfer using similarity methods, integral methods, and superposition. Heat exchanger optimization and design methods. Introduction to mass transfer analysis. Prerequisites: at least one survey course in heat transfer and one in viscous fluid mechanics, equivalent to 250 and 251A.

3 units, Win (Eaton) TTh 2:15


3 units, Spr (Staff) MWF 2:15

253. Radiative Heat Transfer — Fundamentals of thermal radiation heat transfer; analysis of radiative exchange between black and non-black surfaces and enclosures; radiation from gases at high temperature, and particulate-laden gases; combined radiation and conduction. Advanced material for students with interests in heat transfer, as applied in high-temperature energy conversion systems; take 252A,B, to obtain depth in convective heat and mass transfer. Prerequisites: graduate standing, an undergraduate course in heat transfer. Recommended: some computer skills.

3 units, Aut (Mitchell) MWF 10

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, and pulsed-wire anemometers. Prerequisite: previous experience with computer programming.

4 units, Spr (Eaton) MWF 10
plus one 4-hour lab

255. Gasdynamics — Recommended for students with little experience in compressible flow. Introduction to compressible flow. Sound waves and normal shock-waves. Quasi-one-dimensional steady flows in variable area ducts with friction, heating, and cooling; unsteady one-dimensional flow, two-dimensional supersonic flow; oblique shock waves, Prandtl-Meyer expansions.

3 units, Win (Mungal) TTh 11-12:15

256. Turbomachinery, Fluid Dynamics, and Design — Fundamental theory and operation of turbines, pumps, compressors, propellers, wind turbines, and other machines that function as the result of the dynamic interaction of a moving fluid with a bladed rotor. Readings and progressive problem sets. Preliminary specifications of blading for a compressor or turbine. Prerequisites: 251A, or equivalent, and elementary (1D) gas dynamics.

3 units, Spr (Johnston)

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, Aut (Bradshaw) MWF 3:15

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, plus a graduate sequence in fluid mechanics.

3 units, Spr (Reynolds) MWF 2:15

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 ther-
modynamics, 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, such as combustion and gas radiation.

3 units, Aut (Bowman) MWF 9


3 units (Hanson) not given 1994-95

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, equilibrium and non-equilibrium plasmas; plasma diagnostics, application to energy conversion devices, and materials processing. Prerequisite: 262A or consent of instructor.

3 units, Spr (Cappelli) MWF 3:15

264. Optical Diagnostics and Spectroscopy — Introduction to spectroscopy of gases and laser-based diagnostic techniques for measurements of species concentrations, temperature, density, velocity, and other flowfield properties. Topics: electronic, vibrational, and rotational transitions; spectral lineshapes and broadening mechanisms; absorption, fluorescence, Rayleigh and Raman scattering methods; collisional quenching. Prerequisite: 262A or equivalent.

3 units, Win (Hanson) MWF 10


4 units, Spr (Hanson) MWF 10
one 3-hour lab by arrangement

268. Experimental Methods in the Thermosciences — Planning experimental programs, uncertainty analysis, and selection of instrument systems. Steady-state measurements of heat flux, temperature, pressure, and flow rate. Mean-velocity and mean-temperature measurements in boundary layers. Advanced lab problems in heat transfer and fluid dynamics. Prerequisites: at least one graduate course each in heat transfer and fluid mechanics, or consent of instructor.

4 units, Spr (Bradshaw) MWF 10
one 4-hour lab by arrangement


3 units (Ferziger)
alternate years, given 1995-96

THERMODYNAMICS AND ENERGY CONVERSION

270. 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. Use of modern computational equations of state. Thermodynamics of condensed phases. Prerequisites: undergraduate background in engineering thermodynamics and computer skills.

3 units, Aut (Reynolds) MWF 1:15

271. 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 (Bowman) MWF 2:15

272. 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) MWF 1:15

274. Introductory Hypervelocity Aerophysics — (Enroll in Aeronautics and Astronautics 212.)

BIOMECHANICS

280. Biomechanical Engineering Seminar — Invited speakers present research topics at the interfaces of biology, medicine, physics, and engineering.

1 unit, Aut, Spr (Van der Meulen) M 4:15

3 units, Aut (Carter, Staff) MWF 8

281B. Special Projects in Biomechanical Engineering I — Interdisciplinary approaches are used in specific research and development projects associated with diagnosis patient care. Example topics: fracture plate fixation, artificial joint replacement, muscle mechanics, rehabilitation devices. Attendance at Orthopedic and Rehabilitation Grand Rounds. Limited enrollment. Prerequisite: 281A.

4 units, Win (Carter, Staff) MWF 8
plus one hour by arrangement

281C. Special Projects in Biomechanical Engineering II — (Continuation of 281B.) Limited enrollment.

4 units, Spr (Carter, Staff) MWF 8

DIRECTED STUDY AND SEMINARS

290. Thermosciences Research Project Seminar — Review of work in a particular research program and presentations of other related work.

1 unit, any quarter (Staff)
sec. 1 (HTTM), sec. 2 (HTGL)

291. 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) by arrangement

292. 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) by arrangement

294A,B. Design Forum — Invited speakers address issues of interest to designers. Brief presentation followed by open discussion.

1 unit, Aut, Win (Staff) F 2:15

294C. Craftsmanship Seminar — Guest craftsmen make presentations exploring the romance of technology and the relationship between craftsmanship and design. Diverse presentations have included musical instrument building, microsurgery, historical machinery, pipe organ construction and voicing, and blacksmithing.

1 unit, Spr (Freund) F 2:15-3:30

295. Seminar in Solid Mechanics — Problems in all branches of solid mechanics. All Ph.D. candidates in solid mechanics are normally expected to attend.

1 unit, Aut, Win, Spr (Staff) Th 4:15-5:30


1 unit, Aut, Win, Spr (Beach) F 3:15

297. Design Theory and Methodology Forum — A mixture of research reports, literature reviews, and designer interviews promote vigorous examinations of the cognitive basis for designer behavior and design tool development.

1 unit, Aut, Win, Spr (Leifer) W 4:30-5:30

298. Seminar in Fluid Mechanics — (Enroll in Engineering 298.)

299. Teaching Participation — Credit is given for assisting a professor in the teaching of a mechanical engineering course. Prerequisite: consent of the supervising instructor.

1-3 units, Aut, Win, Spr (Staff)


2-15 units, any quarter (Staff) by arrangement

301. Thesis — Dissertation for the degree of Ph.D.

2-15 units, any quarter (Staff) by arrangement

303. Manufacturing and Design — (Same as 103.)


3 units (Moin) alternate years, given 1995-96
309. Finite Element Analysis in Mechanical Design — Part I: basic concepts of finite elements, with applications to problems confronted by mechanical designers. Linear static, modal, and thermal formulations emphasized; nonlinear and dynamic formulations. Students implement simple element formulations in either Fortran or Pascal to obtain a deeper understanding of the essential elements of this numerical technique. Part II: application of a commercial finite element code in analyzing design problems. Issues: solution methods, modeling techniques, basic problem definition. Individual projects focus on the interplay of analysis and testing in product design/development. Prerequisite: ability to program or equivalent. Recommended: 111, Civil Engineering 114, or equivalent in structural and/or solid mechanics; some exposure to principles of heat transfer.

3 units, Spr (Sheppard) WF 3:15-4:30

313. Ambidextrous Thinking — Visual and kinesthetic thinking skills developed and exercised in the context of solving design problems. Quickly executed perspective, orthographic, diagrammatic, and three-dimensional sketches emphasized. Exercises to appreciate and develop the entire body's role in creative thinking. Emphasis on fluent and flexible creative thinking skills developed and exercised in the context of solving design problems.

3 units, Aut (Fast6)

lecture/lab MW 3:15-5:05

315A,B. Integrated Design, 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, joint 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) 
WF 1:20-3:05 plus lab by arrangement

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 topics: 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, and some familiarity with programming.

3 units (Cutkosky)

327A. Advanced Robotic Manipulation — (Enroll in Computer Science 327.)

327B. Introduction to Computer Vision — (Enroll in Computer Science 223B.)


3 units (Kim) alternate years, given 1995-96

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 flow and viscous flow.

3 units, Spr (Lele) TTh 11-12:15

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: gradu-
ate-level courses in compressible flow and viscous flow.

3 units (Lele) given 1995-96


3 units, Aut (Moin) MW 11-12:15 alternate years, not given 1995-96

390. Teaching Assistant Practical Training — For two-year Teaching Assistants. Student obtains summer employment in research or relevant industry. Grading based on a report to be submitted at the end of the summer. Consult the Student Services Manager of the Mechanical Engineering office and the Mechanical Engineering Graduate Handbook.

1 unit, Aut, by arrangement

INTRODUCTORY COURSES

The department offers introductory courses for both undergraduate and graduate students. They are given at several levels and in a variety of combinations to accommodate students’ needs.

Operations Research (OR) 50 is designed for students who wish to become familiar with the basic terminology and ideas of operations research without using mathematics beyond high school algebra. Applications are given to important socioeconomic problems.

OR 152 introduces linear, nonlinear, and dynamic programming for students familiar with calculus. OR 153 introduces stochastic processes and models in operations research for students with a knowledge of calculus and undergraduate level probability theory. OR 154 compresses 152 and 153 for students with similar backgrounds.

OR 241 is a first course in linear programming; matrix algebra is a corequisite. OR 242 explores shortest paths, dynamic programming, convexity, inventory, and production. OR 243 emphasizes the use of integer and nonlinear programming. OR 251 and 252 introduce probabilistic models in operations research. OR 241 and 242 are a more extensive and higher-level presentation of topics of 152. OR 251 and 252 bear a similar relationship to 153.
Students with a good mathematical background and an interest in an advanced introduction to the various fields of operations research may wish to consider one or more of OR 340–349, 351, 355, 356, 358, and 359.

UNDERGRADUATE PROGRAM
BACHELOR OF SCIENCE IN MATHEMATICAL AND COMPUTATIONAL SCIENCE

Although the department does not have an undergraduate degree program, it 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
MASTER OF SCIENCE

The M.S. program in Operations Research (OR) prepares individuals for high-level professional work applying operations research. Thus, the program emphasizes a solid foundation for a lifelong professional career formulating, analyzing, and using operations research models of complex systems to address problems in business or government.

In addition to the University’s basic requirements for the master’s degree discussed in the “Advanced Degrees” section of this bulletin, a candidate must complete an approved course program of 45 units. This program normally can be completed in one academic year (three academic quarters) of full-time work. A number of operations research practitioners in local industry also attend the program part time under the Honors Cooperative Program, taking one or two daytime courses per quarter.

Each student normally fulfills the following requirements for the M.S. degree:

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<th>Course No. and Subject</th>
<th>Units</th>
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<tr>
<td>* Comp. Sci. 105A, 105X</td>
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<td>Computer Programming</td>
<td>3</td>
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<td>* Math. 103, 200</td>
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<td>OR 241, 242</td>
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<td>OR 243, 251</td>
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<td>OR 252</td>
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<td>Stochastic Models in Operations Research</td>
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<td>OR 251</td>
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<td>Probability Models in OR 241, 242</td>
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<td>OR 243, 251</td>
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Electives from the 200 or higher-level offerings of the department (with at most 2 units of OR 290 counted) or from authorized courses in other departments

Total: 45

* These three courses are prerequisites; at most, 7 of these 9 units may contribute to the 45 units.
† With adviser approval, Stat. 202 may be substituted for Stat. 200.

For a more advanced master’s program, students may substitute, with adviser approval, appropriate 300-level courses in the department for required 200-level courses in the department. Electives may be selected for specialization in various areas, for example, numerical analysis, decision analysis, manufacturing, and applied statistics.

No thesis is required. A minimum letter grade indicator (LGI) of 2.75 is required.

ENGINEER

The Engineer degree in Operations Research is for students desiring additional academic preparation beyond the master’s degree for a career of professional practice in operations research.

The degree nominally represents an additional academic year of full-time study beyond the M.S. in Operations Research, and includes a thesis. The thesis normally is in the form of a technical report on a successful contribution to (and participation in) an applied project, such as those being carried out in the department’s Systems Optimization Laboratory or Energy Studies Project.

Since thesis supervision is required, and the department gives priority to providing thesis advisers for qualified students in the Ph.D. program, the availability of thesis supervisors for the Engineer degree is very limited. Therefore, before being permitted by the department to continue study after the M.S. degree, the student must have personally arranged for a faculty sponsor for thesis supervision and, if financial support is needed, for a research assistantship for the thesis project. These arrangements are then subject to the approval of the department’s Admissions and Financial Aid Committee.

The University’s basic requirements for the Engineer degree are outlined in the “Advanced Degrees” section of this bulletin.

DOCTOR OF PHILOSOPHY

The program leading to a Ph.D. in Operations Research is for students primarily interested in a career of research, teaching, or high-level technical work in universities, business, or government. Therefore, the Ph.D. program emphasizes the scientific foundations of operations research. In particular, the program is focused on:
1. The study of the abstract mathematical structure of models derived from real life situations such as allocation models of an enterprise or an economy, energy modeling, network flow models of transportation and communication systems, reliability models of complex engineering systems, queuing models of congestion, modeling and control of dynamic systems, discrete selection models for routing and pattern cutting, policy decisions for production and inventory control, and models for conflict resolution.

2. The development of the mathematical theory and algorithms necessary for the study of these models.

Examples of the disciplines studied include energy and economic modeling, mathematical programming, dynamic programming, stochastic systems, stochastic processes, simulation methodology, network and combinatorial theory, reliability, queuing theory, inventory theory, and game theory.

Candidates for the Ph.D. normally meet the course requirements shown below. Exceptional cases are considered upon petition to the department.

1. Prerequisites: Math. 113, 115 or 171; Statistics 116, 200, 203, 217; Computer Science 106A; Engineering-Economic Systems 212A or Economics 51Q or 202. Students lacking background in some of these areas can include appropriate courses in their program at Stanford.

2. Requirements in Operations Research: at least five of the courses in Group 1 (340, 341, 342, 343, 345, 348); at least five in Group 2 (351, 353, 356, 358, 359); 381; and at least 14 total courses chosen from Groups 1, 2, and 3 (for example, 344, 346, 363, 371, 382).

A doctoral candidate must also fulfill several University requirements, as described in the "Degrees" section of this bulletin. These include passing a University oral examination and completing a dissertation that represents an original contribution to knowledge expressed in a satisfactory form. The department also requires that candidates successfully complete two written comprehensive examinations. For the first examination, the students are normally examined on their selection of three of the following courses: 340, 341, 342 or 348, and 345. Similarly, for the second examination, students normally select three of the following courses: 351, 353, 356, 359. The options may vary from year to year according to what courses are actually offered.

A student performing satisfactorily in the Ph.D. program normally is eligible to receive the M.S. in Operations Research, if desired, after completing 45 units of course work.

Ph.D. MINOR

Doctoral students in other departments may obtain a minor in Operations Research by completing 20 units of 200 or higher-level courses in the department with an average letter grade indicator (LGI) of 3.0 or higher. The courses normally include OR 241, 243, 251, and 253 or approved substitutes.

FELLOWSHIPS AND ASSISTANTSHIPS

Financial aid is available on a competitive basis for qualified doctoral candidates. This includes a number of fellowships as well as some research assistantships supported by departmental research grants and contracts. Although these research assistants work closely with the faculty on their research projects, they usually are able to take close to a full course load. Supplementary financial aid can sometimes be obtained by grading, assisting in special projects, or from University loans.

All applicants for financial assistance must take the General Test and the Subject Test (in a field of the applicant's choosing) of the Graduate Record Examination.

Applications for fellowships and assistantships should be made to the Graduate Admissions Office by February 15.

COURSES

PRIMARILY FOR UNDERGRADUATES

50/150. Models and Applications of Operations Research in Society — (Graduate students register for 150.) Intended for students in the social sciences or pre-engineering desiring a broad introduction to the potential role of operations research in modern society. Analysis of important socioeconomic problems by methods of operations research. Problem areas drawn from energy, environment, health, and urban planning. Term paper required for 150. Prerequisite: high school algebra. DR:6(8)

3 units, Spr (Staff) MW 10:15-11:30

152. Introduction to Operations Research I — (Enroll in Engineering 62.) Theory and computation of optimal selection of decisions under certainty. Linear programming, network optimization models; dynamic, nonlinear, and integer programming. Applications are drawn from a variety of areas, emphasizing high-level problems faced by industrial engineers and management scientists.
Prerequisite: Math. 43 or consent of instructor.

4 units, Aut (Hillier) MWF 1-2:05
Spr (Veinott) MWF 1-2:05

153. Introduction to Operations Research II —

4 units, Win (Glynn) MTWTh 11:15-12:05

154. Operations Research —Introduction to the techniques and models of operations research for students who have not had the equivalent of 152 and 153. Topics are similar to those of 152 and 153. Prerequisites: calculus and Statistics 116.

4 units, Sum (Staff) TTh 3:15-5:30

180. Statistical Issues in Manufacturing — (Enroll in Engineering 110.) Introduction to the statistical ideas used in the design and control of modern manufacturing systems. Relationship to the strategic issues involved in global competitiveness. Topics: introduction to basic probability and statistics, Markov chains, queuing networks, simulation. Applications to production and scheduling, just-in-time inventory management, quality control, materials requirement planning. Software packages are described and used. Prerequisite: Math. 43 or consent of instructor.

3 units (Staff) not given 1994-95

PRIMARILY FOR
MASTER'S CANDIDATES

These courses are oriented toward applications. Operations Research (OR) 241, 242, 243, 251, 252, 253, 281, and 282 form a basic one-year core program aimed at students who desire a professional career involving application of operations research in business, government, or industry.


3 units, Aut (Cottle) TTh 2:45-4

242. Network Programming — Introduction to solving optimization problems on networks. Shortest paths, dynamic programming, present value of money, critical paths, convexity and extreme points, unimodularity, critical paths with cost benefit, minimum cost flows, inventory and production scheduling, minimum spanning trees, complexity, software (AMPL/MINOS). Corequisite: 241 or equivalent.

3 units, Aut (Eaves) TTh 1:15-2:30


3 units, Win (Eaves) TTh 10:30-11:45

246. Mathematical Programming Computation — (Doctoral students register for 346.) Overview of major computational procedures used in solving mathematical programming problems, including large-scale systems. Introduction to computer implementation of algorithms for: linear programming; quadratic programming; unconstrained, linearly constrained, and nonlinearly constrained optimization. Practical experience with techniques that increase speed, stability, and accuracy of computation. Prerequisites: 243 or 341, and Computer Science 106A or equivalent, or consent of instructor.

3 units, Sum (Staff) MW 3:15-5

251. Stochastic Decision Models in Operations Research — Stochastic decision models in operations research applications. Markov decision chains, stochastic programming, and decision analysis. Applications drawn from production and inventory control, yield management, scheduling, capacity planning, transportation, emergency services, reliability/quality control/maintenance, finance, and health care. Structure and computation of optimal policies. Software packages are used. Prerequisites: Statistics 116 and basic linear programming, or equivalent.

3 units, Win (Veinott) TTh 1:15-2:30

252. Stochastic Models in Operations Research — Formulation and analysis of models in operations research involving stochastic processes. Topics: Markovian queues, queues with embedded Markov chains, general single server queue, queuing networks, diffusion approximations, and Markov decision chains. Software packages are used. Prerequisites: 251 and Statistics 217, or equivalent.

3 units, Spr (Hillier) TTh 9:30-10:45

253. Simulation — 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; Statistics 217 or equivalent.

3 units, Spr (Glynn) TTh 11-12:15

281. Case Studies in Operations Research — (Ph.D. students register for 381.) Student teams engage in case studies integrating (and enhancing) problem identification, case definition, case selec-
tion, case analysis, teamwork, project scheduling, task definition, task allocation, task amalgamation, group behavior, technical writing, public speaking, presentation and questioning skills, and software and library usage, etc., as they relate to the effective use of operations research. Enrollment limited. Prerequisites: 241 and 242 or equivalent, and consent of instructor.

4 units, Win (Hillier) TTh 2:45-5

282. Projects in Operations Research — (Ph.D. students enroll in 382.) Student groups identify, develop, solve, and report on operations research field projects from business, institutions, and government. Emphasis on problem solving; involves interaction, formulation, analysis, data collection, report writing, and discussion and presentation to problem sponsor. Enrollment limited. Prerequisite: 281 or consent of instructor.

3 units, Spr (Glynn, Iglehart) TTh 2:45-4:15

283. Operations Research with Spreadsheets — Rereexamines OR techniques introduced in 240 and 250 sequences, e.g., linear and integer programming, network flow problems, inventory theory, and forecasting the simulation techniques in the environment of the spreadsheet. Emphasis is on extending the applicability of these techniques through integration with existing business data structures rather than exploring the underlying mathematical theory. Prerequisites: 241 and 242, or consent of instructor.

3 units, Win (Savage) by arrangement

290. Colloquium — Presentation of current research in operations research.

1 unit, Aut, Win, Spr (Staff) W 4:30-5:30

299. Independent Study — Intensive study of literature of special topics.

any quarter (Staff) by arrangement

PRIMARILY FOR DOCTORAL STUDENTS

These advanced courses are concerned with the development of the mathematical theory of operations research and sophisticated applications thereof.

340. Linear Programming — Basic theory plus lab for learning about the numerical, software, and applicational 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.

4 units, Aut (Dantzig) TTh 1:15-2:30

lab (Thapa) Th 4:15-5:30


3 units, Win (Eaves) TTh 1:15-2:30

342. Equilibrium Programming — Development and application of the solution of equations (models) through piecewise linear deformations and curve following. Topics: models of economies and conflict, subdivisions, piecewise linear maps, regularity, degree, fixed point theorems, general algorithms, and special case algorithms.

3 units, alternate years, given 1995-96


3 units, Aut (Murray) TTh 2:45-4

344. Integer Programming — Introduction to the models and methods of integer programming. Structure of integer programs; implicit enumeration and cutting plane algorithms; exploiting special structures; heuristics; extensions. Corequisite: 340 or consent of instructor.

1 unit, Aut (Hillier) F 9

345. Network Optimization — (Enroll in Computer Science 363.) Algorithms for network optimization problems, e.g., shortest paths, maximum flows, minimum-cost flows, multicommodity flows, dynamic flows, minimum cuts, matching, and assignment problem. Applications to problems such as transportation, production and project planning, distribution, and open-pit mining.

3 units, alternate years, given 1995-96

346. Mathematical Programming Computation — (Same as 246.)

3 units, Sum (Staff) MW 3:15-5

348. Linear Complementarity — 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: 341 or consent of instructor.

3 units, Spr (Cottle) TTh 1:15-2:30


3 units, Spr (Veinott) TTh 9:30-10:45


3 units, Aut (Iglehart) TTh 9:30-10:45


3 units, Aut (Veinott) TTh 11-12:15

358. Queueing Theory — Advanced nonmeasure theoretic course on the foundation of queueing theory. Topics: Markovian queues, embedded Markov chains, general single server queue and random walk theory, Jackson networks, loss systems, multiple channel queues in heavy traffic, and diffusion approximations. Prerequisite: 359 or equivalent.

3 units, Spr (Iglehart) MW 2:15-3:30


3 units, Win (Glynn) TTh 9:30-10:45

361A. Advanced Algorithms — (Enroll in Computer Science 361A.) Advanced data structures: union-find, self-adjusting data structures and amortized analysis, dynamic trees, Fibonacci heaps, universal hash functions and sparse hash tables, persistent data structures. Advanced combinatorial algorithms: algebraic (matrix and polynomial) algorithms, number theoretic algorithms, group theoretic algorithms and graph isomorphism, on-line algorithms and competitive analysis, strings and pattern matching, heuristic and probabilistic analysis (TSP, satisfiability, cliques, colorings), local search algorithms.

3 units (Motwani) alternate years, given 1995-96


3 units, Win (Goldberg) MW 11-12:15 alternate years, not given 1995-96

366. Interdisciplinary Seminar on Conflict Resolution — (Same as Economics 386, Law 325, 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, Tversky, Ross, Wilson) T 4:10-5:30


5 units, Win (Hammond)

368. Economic Applications of Game Theory — (Same as Business 608.) Reviews recent contributions to game theory and its applications to topics in economic theory, e.g., strategic models of bargaining, trading, pricing, industrial competition, and contracting. Examinations of working papers and journal articles from the current literature chosen partly to elaborate research topics suitable for dissertations. Grading based on term paper. Reacom-
mended: familiarity with game theory at level of Business 613.
4 units, Spr (Wilson) MF 3:20-5:05

370. Topics in Mathematical Programming — Seminar with presentations by students and invited speakers. Introduction to techniques for solving structured linear programs. Sparse matrix methods, basis factorization, comparison of exterior and interior methods, generalized linear programming, decomposition principle, convex programming, integer programming, multicommodity problems, stochastic programming. Prerequisite: 340.
3 units, Aut (Dantzig) WF 12-2

371. Optimization Under Uncertainty — 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 (Dantzig) WF 12-2

3 units, Spr (Dantzig) WF 11-1

381. Case Studies in Operations Research — (Same as 281.)
4 units, Win (Hillier) TTh 2:45-4:15

382. Projects in Operations Research — (Same as 282.)
3 units, Spr (Glynn, Iglehart) TTh 2:45-4:15

395. Practical Training — Students obtain summer employment in relevant industrial or research activity. A report on the experience is required early in the Autumn Quarter.
1 unit, Aut (Staff) by arrangement

399. Research — Research in department.
any quarter (Staff) by arrangement

SCIENCE, TECHNOLOGY, AND SOCIETY

Emeriti: (Professors) W. Bliss Carnochan, Raymond E. Clayton, David Freyberg, Edwin M. Good, Eric Hutchinson, Alex Inkeles, Stephen J. Kline, Bernard Siegel, Walter G. Vincenti
Chair: Walter G. Vincenti
Associate Chair: Robert E. McGinn
Advisory Committee: James L. Adams (Industrial Engineering and Engineering Management), Joseph J. Con (History), David Freyberg (Civil Engineering), Stephen Haber (History), Gabrielle Hecht (History), John W. Rick (Anthropology), Nathan Rosenberg (Economics), Sheri Sheppard (Mechanical Engineering), G. Leonard Tyler (Electrical Engineering)

Professors: James L. Adams (Industrial Engineering and Engineering Management; on leave Autumn), John H. Barton (Law), Barton J. Bernstein (History), Stephen Haber (History), Timothy Lenoir (History), John McCarthy (Computer Science), Nathan Rosenberg (Economics), Paul S. Seaver (History)

Associate Professors: David Freyberg (Civil Engineering), Clifford I. Nass (Communication)
Assistant Professor: Gabrielle Hecht (History)
Professor (Research): Michael May (Engineering-Economic Systems)

Professors (Teaching): Gilbert Masters (Civil Engineering), Robert E. McGinn (Industrial Engineering and Engineering Management, and, by courtesy, Civil Engineering)

Associate Professor (Teaching): Eric Roberts (Computer Science)

Senior Lecturer: Joseph J. Corn (History)
Lecturers: Renee Courey (STS), Paul Edwards (STS and Computer Science)

Acting Associate Professor: Ben Crow (Human Biology)
Consulting Professor: Richard Meehan (STS and Civil Engineering)
Consulting Associate Professor: Naushad Forbes (STS and Industrial Engineering and Engineering Management)

Visiting Associate Professor: Barry Katz (STS and Mechanical 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
Science, Technology, and Society (STS) is an interdisciplinary program devoted to understanding the nature, shaping, and consequences 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 Distribution 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 Human Biology and Public Policy.
4. To satisfy the requirements of the STS honors program complementing any standard major (see below).
5. To satisfy requirements for majors 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.

WALTER G. VINCENTI PRIZE
An annual prize is awarded to the author of the best student essay written in STS 1,2,3. This prize honors engineer and historian of technology Professor Walter G. Vincenti, founding member and the first chair of the STS program.

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 (8 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, 130, 131)
      3) Social Science perspectives (STS 107, 162, 172)
   c) Advanced courses (one course in each category):
      1) Disciplinary analysis (STS 207, 210, 215, 220, 221, 222, 232, 255)
      2) Core Seminar (STS 200)
2. Technical Literacy (5 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 the program's technical literacy sequence (STS 51, 52, 53) and one other complementary technical course chosen in consultation with the program or associate chair.
      3) Completing four of the following "Engineering Fundamentals" courses: Engineering 14, 15, 20, 30, 40, 50, 60, 70 (see 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 pre-approved: the intersections of technology and science with aesthetics, development, history and philosophy.
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 associate 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 as guidelines for 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 two stand-alone courses at most) 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 physics, electrical engineering, and computer science, 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.

HONORS PROGRAM

STS offers a limited number of students the opportunity to achieve honors in STS by enriching their education 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 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.
3. Historical Perspective: STS 121 or 122.
4. Social Science Perspective: STS 107, 162, 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 must also achieve a letter grade indicator (LGI) of at least 3.3 in the courses taken to satisfy requirements 1 to 4 above. In the case of STS majors, the student must compile an LGI of at least 3.3 in the entire major curriculum. 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.
COURSES

1, 2, 3. Technology and Culture — The interconnections among intellectual, material, and social conditions from prehistory into the age of computers, space travel, and genetic engineering. DR:1 (three-quarter sequence)

5 units (Staff) given 1995-96

2. The Rise of the West — The consolidation of the scientific worldview in the West from the Middle Ages through the Scientific and Industrial Revolutions; readings from Leonardo da Vinci, Shakespeare, Galileo, Mary Shelley, and others. DR:1 (three-quarter sequence)

5 units (Staff) given 1995-96

3. Modern Times — The interdependence of technology and culture in the 20th century. Topics: personal life, war and peace, the environment, and the transformations of social life in modern America. DR:1 (three-quarter sequence)

5 units (Staff) given 1995-96

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. DR:6(8)

3 units, Aut (Freyberg) MWF 2:15-4:05
WF 2:15-3:05

52. An Introduction to Physics (Physics for Poets) — (Enroll in Physics 19.) 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. DR:(5)

3 units, Aut (Yearian) MWF 1:15

53. The Nature of Mathematics — Introduction to the history, methods, results, and applications of mathematics. Possible topics: from geometry and calculus to the structure of the universe; the potentialities and limitations of computation; topology, knots, and DNA; symmetry in mathematics, art, and nature; uses and misuses of statistics; logic and the philosophy of mathematics.

3 units, Aut (Feferman) TTh 11-12:15

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. DR:9(5)

4-5 units, Aut (McCinn) TTh 2:15-4:05 optional section for extra unit

107. Technology and Economic Change — (Same as Economics 113.) 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, late comers 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 "spillovers" from military R&D, and coping with rapid technological change). DR:9(5)

4-5 units, Spr (Rosenberg) MWF 10 optional section for extra unit

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. A Writing Across the Curriculum course. DR:8(3)

5 units, Win (McCinn) MW 2:15-3:30 plus two-hour section by arrangement

112. Technical Professions and Ethics — Origin and development of the technical professions, especially engineering and the applied sciences, from anthropological, historical, and literary perspectives. Professional ideologies, values, and protocols. Expert-client relations, responsibilities, legal
problems, and ethics. Case histories of ethical problems in governmental and corporate settings. Student readings, case studies, and field work. Limited enrollment.

4 units. (Meehan) given 1995-96

114. Environmental Ethics — For sophomores only. Analysis of ethical issues raised by the ways humans have altered the environment in contemporary Western societies. Attention to natural and human-made environments. 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 10.

3-4 units. (McGinn) M 3:15-5:05

114A. Classical Professionalism — For sophomores only. Careers in engineering, medicine, and law in the classic professional style compared with the prevailing, post-modern, marketing model. Possibilities of heroism. Bill Gates, Herbert Hoover. Readings from Aristotle, Cicero, Jane Austen, Steven Berkoff, Cormac McCarthy, Alistair MacIntyre.

3-4 units. Win. (Meehan) Th 8:30-10:50

114B. Human Artifacts: Things and Their Makers — For sophomores only. Investigation of the things that human beings make. Discussion of argument that human beings along are tool-users, that we only raise our structures in the imagination before realizing them, and that we, uniquely, are makers of symbols. Focus is on several artifacts, moving from functional design to deeper questions of cultural, psychological, and symbolic meaning. Analysis includes such artifacts as the World Trade Center, a patent leather high-heeled shoe, the Golden Gate Bridge, a Sony Walkman, a Harley-Davidson motorcycle, the EuroDisney theme park, and an ATM.

3 units. Spr. (Katz) F 1:15-3:05

115. Ethical Issues in Engineering — (Same as Engineering 131.) Examination of ethical issues in contemporary engineering practice. Topics: 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 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. Spr. (McGinn) MW 2:15-4:05

116. War and Technology — The role of technology, military and civil, in human conflict; theories of aggression; origins of organized violence and the changing relationship between specific technological innovations and warfare in history.

4 units. (Adams) given 1995-96


3 units. Spr. (Katz) F 10-12

118. Quality and the Products of Technology — (Same as Industrial Engineering 214; Mechanical Engineering 214.) Dimensions of product quality, include factors such as performance, economy, reliability and emotional response of the user, cultural consistency, craftsmanship, elegance, human fit, and compatibility with global and social constraints. What quality means in completed industrial products and what must happen in design, production, and business to achieve it. Readings, lectures, projects, papers. Not a quality assurance or quality control in production course. Enrollment limited.

4 units. Win. (Adams) TTh 11-1

121. Technology and Culture in 19th-Century America — (Same as History 115; History and Philosophy of Science 121.) Social and cultural aspects of technological change from the American Revolution through WWI. 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. Win. (Corn) TTh 10 discussion section for 5 units

122. Technology and Culture in 20th-Century America and Europe — (Same as History 234A; History and Philosophy of Science 122.) Undergraduate colloquium on the history of 20th-century Western technology. Topics: the rise of the engineering profession, labor and technological change, gender and technology, the emergence of technocratic ideologies, and the rise of large-scale technological systems.

5 units. (Hecht) given 1995-96

130. The Darwinian Revolution — (Same as History 133; History and Philosophy of Science 152; Human Biology 152; Philosophy 152.) Conceptual developments leading to establishment of the major unifying paradigm of biological science, the theory of evolution by natural selection. Biological thought
before Darwin (1750 to 1836). Formation of Darwin’s thought in terms of its broader intellectual and social context. The Origin of Species. Difficulties the theory had to overcome and their resolution in the union of evolutionary biology and population genetics. DR:9(4)

4 units (Lenoir) not given 1994-95

131. The Industrial Revolution: Historical and Cultural Perspectives — (Same as History 134A; History and Philosophy of Science 141.) 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. DR:9(5)

5 units, Aut (Hecht) TTh 11-12:30

138. Noise Pollution: Technology and Society — Overview of environmental noise and its effect on the quality of life; technical and social aspects. Topics: essentials of sound wave behavior, distinction between sound and noise, noise descriptors (decibels, etc.), hearing and ear damage, masking effects on communication, categorization of noise sources, room acoustics vs. outdoor noise, and elements of noise control technology. Social topics: the economics of noise, residential noise, noisy consumer products, community noise surveys, concept of quiet as a commodity, and noise legislation and ordinances. Field trips to NASA laboratories and a local airport.

3 units, Aut (Bershader) TTh 2:15-3:30

145. Women and Technology — (Same as Feminist Studies 147B; History and Philosophy of Science 123.) Seminar on current and historical intersections between technologies and women’s lives. Themes: the role of technologies, especially reproductive and visual technologies, in constructing the roles of women; women as developers and users of technology; gendered descriptions of technology, technological professions and the process of technology development; women at work and women’s work in different historical periods. Discussion based on novels, reports and historical literature, commercials, and films.

5 units, Win (Courey) W 2:15-4:05

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 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) TTh 3:15-4:30

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: the role of military funding and weapons systems development in computer research; the rise of hacker culture; economic impacts of computers (as products and “productivity” investments); and the interaction of science fiction with computer development and popular attitudes towards computers. Emphasis on understanding the relationship between the micro level of lab research and engineering and the macro levels of economic, governmental, and social forces. Familiarity of computation is assumed.

5 units, Win (Edwards) TTh 1:15-3:05

162. Communication, Technology, and Society — (Same as Communication 169/269; Sociology 133/233.) Methods for analyzing and addressing the question: Does technology drive societal change or does society drive technological change? Three case studies: computers and the self, mass media and community, and the information economy. DR:9(5)

4 units, Spr (Nass) TTh 10-11:50

164. America and the “Bomb”: Politics, Diplomacy, and Culture in the Nuclear World, 1939-Present — Issues of nuclear weapons, emphasizing early development, use on Japan in 1945, military planning and diplomatic leverage and threats, efforts at disarmament and arms control, the H-bomb decision and tactical weapons, disputes over nuclear testing and fallout, the development of deterrence and its critics, the roles of scientists and the strategy community, and various peace movements. (Bernstein) given 1995-96

170. Work, Technology, and Society — (Enroll in Industrial Engineering 107.) 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. Focuses on the U.S. with selected key trends in 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, the work lives of engineers in Silicon Valley, and innovative public and private policies on work. Limited enrollment. DR:9(5)

4 units, Spr (McGinn) TTh 2:15-4:05

172. The Role of Technology in Policy Decisions — (Same as Engineering-Economic Systems 171; Political Science 136P.) Same objectives as
179A. Technology and Policy in Newly-Industrializing Countries — (Graduate students register for 279A, same as Industrial Engineering 279.) Technology is seen as the key to development and prosperity in most parts of the world. The relationship between technology and industrial development. Issues relating to building technological capability in Newly-Industrializing Countries: the concept of technology leader and technology follower environments; technology transfer; independent technical capacity; public and private sector R&D; education and human capital for technological capability; the role of small firms and new enterprises in technological capability. National technological capability is seen as the sum of all technological capabilities. These issues from a national policy perspective and from the firm-level perspective of managing the innovation process in a follower environment.

3 units, Aut (Forbes), four weeks only MTWTh 11-12:15, plus F by arrangement

179B. Comparative Technology Policy in Newly-Industrializing Countries — (Graduate students register for 279B.) Seminar on government policy for technology in selected newly-industrializing countries. Policies are in a comparative perspective for Brazil, India, Korea, and Mexico, with some focus on Singapore and Taiwan. Other countries reflect student interest, availability of information, and instructor knowledge. Student focus on the NIC of interest. Prerequisite (one of): 179A/279A, 280, 169, 369; Industrial Engineering 279, 281; or consent of the instructor based on substantial prior preparation.

3 units, Spr (Forbes) four weeks only five hours per week

180. Dispute Resolution for Engineers — 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, Spr (Meehan) TTh 9-11

190A,B,C. Honors Project — Project for students in STS honors program.

190A. Submission of Proposal
2-5 units, Spr (Staff) by arrangement

190B. Continued Study and Writing
5 units, Aut (Staff) by arrangement

190C. Final Work on Project
5 units, Win (Staff) by arrangement

195. Honors Tutorial
1 unit, Aut (Staff) by arrangement

199. Individual Work
1-5 units, Aut, Win, Spr (Staff) by arrangement

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, Hecht) M 3:15-5:05

ADVANCED UNDERGRADUATE AND GRADUATE

201. Science, Technology, and Contemporary Society — (Same as Engineering 130.) See 101.
4-5 units, Aut (McGinn) TTh 2:15-4:05 optional section for extra unit

207. Science and Technology in Economic Growth — (Same as Economics 224.) 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 on the interactions between science and technology, and the organizational factors which have influenced their effectiveness in contributing to productivity growth.

4-5 units, Win (Rosenberg) MW 11-12:50

210. Ethics and the Built Environment — Seminar on ethical and values issues raised by the constitution and transformation of the built environment in urban industrial societies. Analysis of built-environment-related ethical issues that confront architects, city planners, civil engineers, and ordinary citizens. Consideration of ethical issues raised by material structures (tall buildings, highways, houses), traffic (vehicles, pedestrians, tourists), “signage” (billboards, shop signs, graffiti), the “soundscape” (technological noise, natural sounds), and public social spaces (streets, plazas, malls and playgrounds). Limited enrollment.

3-4 units (McGinn) given 1995-96

215. Computers, Ethics, and Social Responsibility — (Same as Computer Science 201.) Primarily for majors entering computer-related fields. Analysis of ethical and social issues related to the development and use of computer technology. Introduc-
tion 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 their applications and consequences of their work. Small group discussion emphasizes developing analytical skills. Prerequisite: Computer Science 106B or 106X.

3-4 units, Spr (Robert) MWF 11:12:15

220. Graduate Colloquium: The Process of Industrialization — Europe, The United States, and Latin America — (Same as History 303C.) 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.

4-5 units (Haber) given 1995-96

221. Seminar: The Automobile Industry In 20th-Century America — (Same as History 263A.) Colloquium 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 governmental regulation; and recent challenges to the industry stemming from technological change, foreign competition, and environmentalism.

5 units (Corn) given 1995-96

222. Science and High-Technology in Silicon Valley, 1930-1980 — (Same as History and Philosophy of Science 151/251; graduate students register for 251.) Two-quarter research seminar. 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, semi-conductors, and computers; economies of skills; university-industry relations; political dissent and the counter-culture; and the techno-scientific policies of the Cold War state. Comparison with Route 128. Winter Quarter: review research literature and explore archival and other resources at Stanford and at local companies. Spring Quarter: complete research papers using these source materials.

5 units, Win, Spr (Lenoir) W 1:15-4:05

232. Science, Technology, and Society — (Same as Anthropology 232; History and Philosophy of Science 232.) Graduate and advanced undergraduate seminar. Examines science as social activity and explores 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.

3 units, Aut (Fujimura) W 2:15-5:05

243. Technology, Work, and Culture since the Industrial Revolution — (Same as History 336A; History and Philosophy of Science 243.) Graduate colloquium. Changes in the nature and organization of work in the 19th and 20th centuries in Europe and America. Readings focus on the relationships between technology, work, and social and cultural change, emphasizing questions of risk, skill, and gender.

4-5 units (Hecht) given 1995-96

250. The Politics of Technical Decisions — Many public choices involve decisions about technologies or technical systems and are virtually inseparable from political factors. Seminar on how technical decisions are made and how the policy process has evolved since WWII. Technical decisions within regulatory agencies, and in the political, historical, social, cultural, and economic contexts of a technologically oriented society. Survey of technical decision-making in the U.S. since WWII, origins and functioning of key institutions (the National Science Foundation, the Office of Technology Assessment, and the Environmental Protection Agency). Case studies of particular technical decisions, (proposed national information infrastructure, global warming, the RU-486 "abortion-pill," space flight, nuclear power, numerical-control machine tools, and nuclear missile defense). Enrollment limited to 15 advanced undergraduates and graduates.

4-5 units, Spr (Edwards) TTh 1:15-2:35

255. Biotechnology: Legal and Policy Issues — (Same as Law 604.) Open to graduate and professional students from all parts of the University, and by consent of instructors, to qualified undergraduates. Interdisciplinary exploration of legal and policy issues raised by the biotechnology industry. Materials on biological science and technology for non-scientists and on law for non-law students. Topics: patenting, corporate organization and funding, conflicts of interest, regulatory approvals, health care financing issues, tort liability, and the prospects for and implications of the biotechnology revolution. Hypothetical problems, class presentations by interdisciplinary student teams. Enrollment limited to 40. Non-law students receive five units of credit for the Spring Quarter.

5 units, Spring semester (Barton, Botstein, Greely) TW 11:12:15

270. Poverty, Technology and Rural Industrialization — (Same as Human Biology 137.) Can technical change reduce rural poverty in developing
countries? Ways of understanding rural poverty, technical change, and the relationship between them. Debates about large- and small-scale technologies, industrialized and peasant agriculture, alternative and appropriate technology, connections between industry and agriculture, indigenous and western knowledge, gender and the control of technology, and forms of labor mobilization. Case studies from Asia, Southeast Asia, Africa, and Latin America. Collective research project explores a debate about technical change within a social context. Seminar, limited enrollment.

3 units, Spr (Crow)

279A. Technology and Policy in Newly-Industrializing Countries — (Same as Industrial Engineering 279) See 179A.
3-4 units, Aut (Forbes) four weeks only
MTWTh 11-12:15, plus F by arrangement

279B. Comparative Technology Policy in Newly-Industrializing Countries — See 179B.
3-4 units, Spr (Forbes) four weeks only
five hours per week

280. Management of Technology in Newly-Industrializing Countries — (Same as Industrial Engineering 281) For engineering, business, and International Policy Studies graduate students; advanced undergraduates with consent of instructor. The management of innovation is key to the success of any firm, particularly technology-based. Managing innovation is different in a technology-follower environment. Workshop examines how firms build technological capability by studying issues such as technology transfer, R&D management, incremental innovation and continuous improvement, links between firms and universities/research institutes, and the relevance of “Japanese” management to a firm in an industrializing country. Limited enrollment. Prerequisite (one of): 169, 179A/279A, 369; Industrial Engineering 281; or consent of the instructor based on substantial prior preparation.
3 units, Spr (Forbes) four weeks only
five hours per week

299. Individual Graduate Work
1-5 units, Aut, Win, Spr (Staff) by arrangement

RELATED DEPARTMENT OFFERINGS

ANTHROPOLOGY

160. Gender and Science
5 units, Aut (Fujimura)

162A. Topics in Socio-Cultural Studies of Biotechnology — (Same as History and Philosophy of Science 162A, Human Biology 164)
5 units, Win (Fujimura)

CIVIL ENGINEERING

174. Ethical Issues in Civil Engineering
3 units (McGinn)
alternate years, given 1995-96

ECONOMICS

303A, B.C. Workshop in the Economics of Science and Technology
10 units, Aut, Win, Spr (Staff) by arrangement

ENGINEERING-ECONOMIC SYSTEMS

170. The Role of Technology in National Security — (Same as Political Science 134P.)
3 units, Aut (May) MW 4:15-5:30

HISTORY

135A. The Nuclear Age — (Same as History and Philosophy of Science 142.)
5 units (Hecht) given 1995-96

152. Introduction to Material Culture — (Same as American Studies 152)
5 units, Spr (Corn) TTh 1:15-3:05

334A. Technology and Society
4-5 units, Aut (Hecht) Th 2:15-4:05

434A. Topics in the History of Technology
4-5 units, Win (Hecht) Th 2:15-4:05

HISTORY AND PHILOSOPHY OF SCIENCE

148. From Gutenberg to Volkswagen: Technology and Culture in Germany — (Same as German Studies 175/175A)
4 units, Spr (Lowood) MWF 10

154. The Rise of Scientific Medicine — (Same as History 133A, Human Biology 151.)
4 units, Win (Staff) MTWTh 10

155/255. The Sociology of Scientific Knowledge — (Same as Anthropology 155, History 133B.)
4 units (Lenoir, Fujimura) not given 1994-95

168. History of Physics — (Same as History 139A.)
5 units, Win (Staff) MTWTh 10

HUMAN BIOLOGY

145. Third World Development
5 units, Aut (Crow) MW 9-10:30

POLITICAL SCIENCE

125. The Rise of Industrial Asia
5 units, Aut (Okimoto, Lau, 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.
SCIENTIFIC COMPUTING AND COMPUTATIONAL MATHEMATICS PROGRAM

Director: Gene Golub
Core Faculty: Gene Golub (Computer Science), Robert Dutton (Electrical Engineering), Joseph B. Keller (Mathematics, emeritus), Walter Murray (Operations Research), Joseph Oliger (Computer Science), George Papanicolaou (Mathematics), Juan Simo (Mechanical Engineering), Andrew Stuart (Computer Science and Mechanical Engineering)

Associate Faculty: Khalid Aziz (Petroleum Engineering), Joel Ferziger (Mechanical Engineering), George M. Homsy (Chemical Engineering), Thomas J. Hughes (Mechanical Engineering), Thomas Kailath (Electrical Engineering), T. P. Liu (Mathematics)

Affiliated Faculty: S. Boyd (Electrical Engineering), J. Cioffi (Electrical Engineering), R. Cottle (Operations Research), T. Cover (Electrical Engineering), G. Dantzig (Operations Research), S. Doniach (Applied Physics), D. Donoho (Statistics), C. Eaves (Operations Research), J. Friedman (Statistics), I. Johnstone (Statistics), J. Koseff (Civil Engineering), K. Law (Civil Engineering), R. MacCormack (Aeronautics and Astronautics), P. Moin (Mechanical Engineering), W. Reynolds (Mechanical Engineering), B. Roth (Mechanical Engineering), M. Saunders (Operations Research), C. Steele (Mechanical Engineering), R. Street (Civil Engineering)

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 letter grade indicator (LGI) 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, 237, 238, 256A,B,C, 274; Statistics 300A,B,C, 305, 306A,B, 310A,B,C; Mechanical Engineering (ME) 233A. Other courses can be substituted with consent of the adviser and 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; 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 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 "Advanced 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 an LGI 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.

COURSES


220A. 3 units, Aut (Hassell) TTh 9:30-10:45
220B. 3 units, Win (Kuske) TTh 9:30-10:45
220C. 3 units, Spr (B. Zhang) TTh 9:30-10:45

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 — (Enroll in Computer Science 237A.) Solution of systems of linear equations: direct methods, error analysis, structured matrices; iterative methods and least squares. Parallel techniques. Prerequisites: Computer Science 106A, 137; Math. 103 or 113.

3 units, Aut (Golub) MW 11-12:15


3 units, Win (Stuart) MW 11


3 units, Spr (Oliger) MW 11-12:15


337. Numerical Methods for Initial Boundary Value Problems — (Enroll in Computer Science 337.) Initial boundary value problems 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.

not given 1994-95

338A. Dynamical Systems — (Enroll in Mechanical Engineering 233A.) Dynamical systems are governed by mappings or ordinary differential equations and 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 illustrated with examples from mechanics. Prerequisites: Math. 130, consent of instructor.

3 units, Win (Stuart) TTh 9:30-10:45


3 units, Spr (Staff) TTh 9:30-10:45

398. Curricular Practical Training — Provides students with on-the-job training under the guidance of experienced, on-site supervisors. Students must register the quarter after their training. Students receive credit and a grade after submitting a concise report detailing work activities, problems worked on, and key results. Prerequisite: written consent of adviser.

1 unit, any quarter (Staff) by arrangement

399. Independent Project
any quarter (Staff) by arrangement

499. Advanced Reading and Research — Prerequisites: majoring in Scientific Computing and Computational Mathematics; consent of instructor.
any quarter (Staff) by arrangement
Dean: John B. Shoven
Associate Deans: John W. Etchemendy, Anne E. Peck, Ramon Saldivar, David O. Siegmund
Senior Associate Dean for Planning and Management: John L. Hughes
Associate Dean for Finance: Nancy J. Padgett
Assistant Deans: Joan Minor, Ellen Woods

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: 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 sec-
tions of the announcements following. They should consult also the department or program in which they intend to specialize.

For regional or area studies and other special programs leading to the degree of Doctor of Philosophy, refer to the "Graduate Special Programs" section of this bulletin.

UNDERGRADUATE PROGRAM IN AFRICAN AND AFRO-AMERICAN STUDIES

Chair: Horace Porter
Steering Committee: David Abernethy (Political Science and African Studies), Earl Black (African and Afro-American Studies), Sandra Drake (English), Harry Elam (Drama), James Gibbs (Anthropology), John Rickford (Linguistics), Arthur Walker (Physics and Applied Physics), Sylvia Wynter (emerita), one representative from the Black Student Union.

Participating Faculty: Lucius Barker (Political Science), Clay Carson (History), Sandra Drake (English), Harry Elam (Drama), John Gill (Electrical Engineering), Sharon Holland (English), Kennell Jackson (History), Horace Porter (English), John Rickford (Linguistics), Ewart Thomas (Psychology), Arthur B. C. Walker (Physics and Applied Physics), Sylvia Wynter (emerita)

UNDERGRADUATE PROGRAM

The African and Afro-American Studies (AAAS) program should provide an interdisciplinary introduction to (I) the field of Afro-American history, literature, and culture as a central component of American culture; and (II) to the field of African history, literature, and culture as well as the history, literature, and culture of people of African descent. Department majors are expected to develop some knowledge in both fields but with a special emphasis on either (I) or (II).

All majors and double majors are expected to take a total of 55-60 units, of which 25-30 must be selected from the core courses. AAAS 105 is mandatory. Additionally, 25-30 units are to be selected from (I), (II), or a special program devised by the student (III). Each of these options consolidates as well as broadens the work of the core.

If they choose option (III), students majoring in AAAS may devise a program with a special theme. This choice allows the student to focus 25-30 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. Honors work is possible with this option.

AAAS majors have numerous opportunities to obtain academic advising. The director advises all majors, and their progress is closely followed by the program coordinator. When the time comes to choose between the three options for study, students can turn to faculty with expertise in the different areas. The program gives the students a chance to discuss academic choices with the program's many faculty and aims to provide them with the best possible advising.

REQUIREMENTS

CORE COURSES (25-30 units)

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>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>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>
</tbody>
</table>

(I) AFRO-AMERICAN HISTORY, LITERATURE, CULTURE, AND SOCIETY (25-30 units)

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>118. Race in American Sport</td>
<td>5</td>
</tr>
<tr>
<td>122. Film Images of African-American Culture</td>
<td>5</td>
</tr>
<tr>
<td>Linguistics 73. Black English</td>
<td>4</td>
</tr>
<tr>
<td>Linguistics 153. Inter- and Intra-Ethnic Variations in Urban Vernacular English</td>
<td>4</td>
</tr>
<tr>
<td>Political Science 181. African-Americans and the Political System</td>
<td>5</td>
</tr>
<tr>
<td>Psychology 127. Afro-American Psychology</td>
<td>3</td>
</tr>
<tr>
<td>Sociology 144. Social Mobility</td>
<td>5</td>
</tr>
</tbody>
</table>

(II) AFRICAN HISTORY, CULTURE, AND SOCIETY: HISTORY, CULTURE, AND SOCIETY OF THE BLACK DIASPORA (25-30 units)

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>History 148C. Africa in the 20th Century</td>
<td>5</td>
</tr>
<tr>
<td>History 149. Africa Since 1935</td>
<td>5</td>
</tr>
<tr>
<td>Political Science 118B. The Politics of Race and Class in Southern Africa</td>
<td>5</td>
</tr>
</tbody>
</table>

DOUBLE MAJORS

Many students in the program are double majors. Over the years, students have found that continuing a major in one field with a strong con-
centration in Afro-American Studies is an exciting intellectual choice. Almost any field complements the program offerings, even the sciences and engineering.

If a student decides to double major in Afro-American Studies, the student must take the core courses (25-30 units). In addition, the student must choose 25-30 units from various departmental offerings. Thus, the total number of units required for a double major in this field is 55-60. To determine the additional units, the prospective double major should consult with the director of the program.

HONORS

Majors may receive a maximum of 10 units for completing an honors thesis or project of comparable quality by the end of the senior year. The 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 honors project must be discussed with and approved by the major adviser and program director. A written proposal must be submitted for consideration no later than Autumn Quarter of the senior year.

DIRECTED READING

Directed reading allows students to focus as many as 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.

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 (Afro-American Studies 198A, 3-5 units, Winter and Spring Quarters) on the student’s transcript. A special, high-quality video advertising the program is available for interested applicants to view. Kennell Jackson, Jr., in the Department of History, is the head of the USP.

COURSES

AAAS PROGRAM OFFERINGS

59A,B,C. Dance Theater Production
1-5 units, Aut, Win, Spr (Staff)

105. Introduction to African and Afro-American Studies—(Same as Anthropology 105.) Introduces African and Afro-American Studies as an interdisciplinary field, exploring some of the central themes in Afro-American culture and history as they relate to race as a definitive American phenomenon from slavery to the present. Possible topics: African survivals in the New World, interpretations of slavery in the New World, contrasting interpretations of the Black family, and various aspects of Afro-American literature and art. Possible readings: Frederick Douglass, Harriet Jacobs, Booker T. Washington, W. E. B. DuBois, Richard Wright, Maya Angelou, James Baldwin, Malcolm X, Alice Walker, and bell hooks. Focus of course may vary each year. DR:3
5 units, Win (Porter)

5 units (Porter) not given 1994-95

122. Film Images of African-American Culture—(Same as Anthropology 130, Communication 138.) The nature of the images of African-Americans and African-American culture as portrayed on film. The sources of those images (including the sources in African-American culture itself), their variations, and how they have changed over time. Historical trends are related to changes in overall American race relations and American popular culture, including the film media. Traces links to African-Americans’ self-conceptions and their status and power in American society. DR:3
5 units (Gibbs) not given 1994-95

5 units, Spr (Porter)

190A,B,C. Directed Reading
1-15 units, Aut, Win, Spr (Staff)

195A,B,C. Martin Luther King, Jr. Papers Project
1-4 units, Aut, Win, Spr (Carson)

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, units, days, times, instructors, quarter, and Distribution Requirements (DR) information.
ANTHROPOLOGY
5 units (Gibbs) not given 1994-95
108B. Africa: Gender and Representation
5 units (Ebron) not given 1994-95
234. Seminar on African Law — (Same as African Studies 234.)
5 units, Win (Gibbs)

DANCE
182. Jazz Dance II
1 unit, Aut, Win, Spr (Staff)
185. African-Caribbean Roots of American Jazz Dance
2 units, Aut (Staff)
186. African-Caribbean Dance Technique
2 units, Spr (Staff)

DRAMA
29. Theater Performance: Acting
1-3 units, any quarter (Staff)
39A, B, C. Theater Performance: Crew
1-3 units, any quarter (Staff)
156. Contemporary Ethnic Drama
4 units, Spr (Elam)
157. Contemporary Black Playwrights
4 units (Elam) given 1995-96
157M. El Sexto Sol: Latino/Chicano Teatro for the Next Millennium
4 units, Aut (Moraga)

ECONOMICS
118. The Economics of Development — Prerequisite: Economics 51.
5 units, Spr (Kochar)

ENGLISH
159. African American Poets
5 units, Win (Holland)
187H. Seminar: Black Popular Culture
5 units, Aut (Holland)
189. Seminar: Caribbean Women Writers
5 units, Win (Adisa)
229A. Colloquium: Death and the Grotesque in Native and African-American Literature
4-5 units, Aut (Holland)

FOOD RESEARCH INSTITUTE
103. The World Food Economy — (Same as Economics 106.)
5 units, Win (Falcon, Naylor)
121. Development and Population Interactions in the Third World — (Same as Economics 119.)
5 units, Win (Yotopoulos)
136. Population, the Environment, and the Third World — (Same as Economics 133, Human Biology 136.)
5 units, Spr (Arthur)

GERMAN STUDIES
137. Filmic Constructions of “The Primitive."
3-5 units, Win (Rentzschler)

HISTORY
46S. Introductory Seminar: African Resistance Movements in the Colonial Era
5 units, Win (Staff) T 1:15-3:05
50. African-American Alternative Film
1 unit, Aut (Carson) T 8-10 p.m.
146. Modern South Africa
5 units, Aut (Gish) MTWTh 10
148. Introduction to African History
5 units (Jackson) not given 1994-95
5 units, Aut (Carson) MTWTh 10
164. Introduction to Race and Ethnicity in the American Experience
5 units, Spr (Fredrickson, Gutierrez) MTWThF 11-12:15
200M. Undergraduate Directed Research: Martin Luther King, Jr. Papers Project
Staff
246. Undergraduate Colloquium: Politics and the Imagination in 20th-Century South Africa
5 units, Spr (Crais) W 3:15-5:05
248. Undergraduate Colloquium: Popular Culture in Africa
5 units, Spr (Jackson) T 1:15-3:05
248S. Undergraduate Research Seminar: Colonial States and Societies in Africa
10 units, Win, Spr (R. Roberts) Th 2:15-5
249. Undergraduate Colloquium: Religions, Cultures, and History in West Africa and the African Americas
1, 3 or 5 units, Aut (R. Roberts) Th 3:15-5:05
259. Undergraduate Colloquium: Black and White in the United States and South Africa
5 units, Win (Fredrickson) W 1:15-3:05
264S. Undergraduate Research Seminar: The Papers of Martin Luther King, Jr. and the Modern Civil Rights Movement
5 units, Aut (Carson) M 1:15-3:05
283. Undergraduate Colloquium: Comparative Slave Societies — Brazil, the Caribbean, and the United States
5 units, Aut (Libby) M 3:15-5:05
LINGUISTICS

73. African American Vernacular English
4 units, not given 1994-95

150. Introduction to Sociolinguistics
4-6 units, Win (Rickford)

606A,B,C. Beginning Swahili
4 units, Aut, Win, Spr (Mugane)

607A,B,C. Intermediate Swahili
3 units, Aut, Win, Spr (Mugane)

MUSIC

5E. African American Women Making Music: Voices and Images of Change
3 units, Aut (Johnson) MW 10:30-12

POLITICAL SCIENCE

118A. Political Change in Tropical Africa
5 units (Abernethy) given 1995-96

118B. The Politics of Race and Class in Southern Africa
5 units, Spr (Abernethy)

181. African Americans and the Political System
5 units, Spr (Staff)

PORTUGUESE

184. Lusophone African Oral Literature
3-5 units, Aut (Carvalho)

PSYCHOLOGY

60. Statistical Methods
5 units, Aut (Thomas) MTWThF 9

127. African American Psychology
3 units, Spr (McCants) MWF 10

AFRICAN STUDIES

Emeriti: Raymond D. Giraud, Joseph H. Greenberg, Bruce F. Johnston, Sylvia Wynter
Chair: Richard Roberts

Professors: David B. Abernethy (Political Science), Jean-Marie Apostolidès (French and Italian), Paul F. Basch (Medicine), Russell Berman (Comparative Literature), Joan Bresnán (Linguistics), Martin Carnoy (Education), Walter P. Falcon (Food Research Institute), James Lowell Gibbs, Jr. (Anthropology), Carl Gotsch (Food Research Institute), William B. Gould (Law, on leave), William R. Leben (Linguistics), Valentin Mudimbe (French and Italian, and Comparative Literature), Scott R. Pearson (Food Research Institute), Hans N. Weiler (Education and Political Science, on leave), Pan A. Yotopoulos (Food Research Institute)

Associate Professors: Sandra E. Drake (English and Comparative Literature), Kennell A. Jackson, Jr. (History), Elisabeth Mudimbe-Boyi (French and Italian), Horace A. Porter (English, and African and Afro-American Studies), Francisco O. Ramirez (Education), Richard Roberts (History)

Assistant Professors: Paulla E. Ebron (Anthropology), Marcel Fafchamps (Food Research Institute), Akhil Gupta (Anthropology), Frederick Zimmerman (Food Research Institute)

Lecturers: Khalil Barhoum (Senior Lecturer, Linguistics), Nelson Carvalho (Visiting Lecturer, Spanish and Portuguese)

Curators: Peter Duignan (Senior Fellow, Hoover Institution), Karen Fung (Deputy Curator, Hoover Institution), Lewis Gann (Senior Fellow, Hoover Institution), David Rozkusza (Librarian, Green Library Government Documents), Thomas Seligman (Director, Stanford Museum of Art)

Senior Research Fellow: Larry Diamond (Hoover Institution)

The Committee on African Studies coordinates an interdisciplinary program in African Studies for undergraduate and graduate students from various departments. Under special arrangement 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 415-723-0295 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 Department of Linguistics to offer instruction in other African languages. In recent years, the Special Language Program has offered courses in Afrikaans, Bambara, Hausa, Igbo, Oshivambo, Shona, Wolof, Yoruba, and Zulu.

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 Certificate in African Studies. Students majoring in any field qualify for this certificate by meeting the following requirements:

1. Taking at least 25 units of "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).

The certificate is awarded directly to the student by the Committee on African Studies and does not appear on a student's transcript or diploma. For more information, call the Center for African Studies at 415-723-0295.

GRADUATE STUDY

At the graduate level, Stanford offers the following possibilities for those who wish to become specialists in African Studies:

1. 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, the Stanford International Development Education Committee, and the Food Research Institute also permit students to specialize in African Studies.

2. Through the Graduate Special Program administered by the Committee on Graduate Studies. The student seeking a Ph.D. may, with approval, form a committee of four faculty members representing at least two academic departments and pursue an individually tailored graduate program that includes African Studies.

COURSES

234. Seminar on African Law — (Same as Anthropology 234.) African indigenous legal systems and their interaction with European law imposed during the colonial period, and changing post-independence dynamics of that interrelationship. Focuses on law in Botswana and Liberia. Student paper may treat law in other African countries.

5 units, Win (Gibbs)

AFFILIATED DEPARTMENT OFFERINGS

See respective department listings for course descriptions, units, days, times, instructor, quarter, and Distribution Requirement (DR) information.

AFRICAN AND AFRO-AMERICAN STUDIES

105. Introduction to African and Afro-American Studies — (Same as Anthropology 105.)

5 units, Win (Porter)

ANTHROPOLOGY

6. Human Origins — (Same as Human Biology 6.)

5 units, Win (Klein)

11C. Gender in Cross-Cultural Perspective — (Same as Feminist Studies 140.)

5 units (Ebron) not given 1994-95
5 units (Gibbs) not given 1994-95

108B. Africa: Gender and Representation—
(Same as Feminist Studies 134B.)
5 units (Ebron) not given 1994-95

128. Ethnographic Film—(Same as Communication 115.)
5 units, Win (Gibbs)

130. Film Images of African-American Culture—
(Same as African and Afro-American Studies 122, Communication 138.)
5 units (Gibbs) not given 1994-95

151A. Comparative Cultural Studies
5 units, Spr (Ebron)

242. Reading Theory Through Ethnography
5 units (Ebron) not given 1994-95

243. Culture as Commodity
5 units (Ebron) not given 1994-95

256. Imaginary Homelands: Constituting Diasporic Communities
5 units, Win (Ebron)

DANCE

185. African-Caribbean Roots of American Jazz Dance
2 units, Aut (Staff)

186. African-Caribbean Dance Technique
2 units, Spr (Staff)

EDUCATION

306D. World, Societal, and Educational Change: Comparative Perspectives—(Same as Sociology 332.)
5 units, Aut (Ramirez) MWF 11-12:30 and by arrangement

ENGINEERING

297A,B,C. Ethics of Development in a Global Environment (EDGE)—(Same as Anthropology 133A,B,C, Political Science 140A,B,C.)
1-4 units, Aut, Win, Spr (Packenham, Lusignan, Gupta)

FOOD RESEARCH

103. The World Food Economy—(Same as Economics 106.)
5 units, Win (Falcon, Naylor) MW 9-10:50

121/219. Development and Population Interactions in the Third World—(Same as Economics 119.)
5 units, Win (Yotopoulos) TTh 1:15-3:05

136. Population Perspectives in the Third World—(Same as Economics 133, Human Biology 136, Sociology 153.)
5 units, Spr (Wilson) MW 9-10:50

149/249. Development Theory at Work: Can Africa Succeed?—(Same as Economics 125.)
5 units (Fafchamps) given 1995-96

FRENCH AND ITALIAN

360A. Topics in French and Francophone Literature: The Discourse of (Self) Representation
3-5 units, Spr (Mudimbe-Boyi)

HEALTH RESEARCH AND POLICY

270. International Health
2-4 units, Spr (Basch) Th 1:15-3:05

HISTORY

5 units, Win (McKittrick)

146. Modern South Africa
5 units, Aut (Gish)

148C. Africa in the 20th Century
5 units, Win (Roberts) MTWTh 10

149. Africa since 1935
5 units (Jackson) not given 1994-95

149A. East Africa in History
5 units (Jackson) not given 1994-95

246. Undergraduate Colloquium: Politics and the Imagination in 20th-Century South Africa
5 units, Spr (Crais) W 3:15-5:05

246B. Undergraduate Colloquium: Mau-Mau Uprising—Kenya in the 1950s
5 units (Jackson) not given 1994-95

246S. Undergraduate Research Seminar: East Africa in Transition—1880s-1920s
5 units (Jackson) not given 1994-95

247A. Undergraduate Colloquium: African Identity in a Changing World
3-5 units (R. Roberts) not given 1994-95

247S. Undergraduate Research Seminar: Fieldwork in Africa—Oral History, Life, and Family History
5 units (Jackson) not given 1994-95

248. Undergraduate Colloquium: Popular Culture in Africa
5 units, Spr (Jackson)

248S. Undergraduate Research Seminar: Colonial States and Societies in Africa
5 units, Win (Roberts)

249. Undergraduate Colloquium: Religions, Cultures, and History in West Africa and the African Americas
5 units, Aut (Roberts)
346A. Graduate Colloquium: African History and the African Novel
4-5 units (Jackson) not given 1994-95

347B. Graduate Core Colloquium in African History — The Colonial Period
4-5 units (R. Roberts) not given 1994-95

348. Graduate Colloquium: Popular Culture in Africa
4-5 units, Spr (Jackson) T 1:15-3:05

349. Graduate Core Colloquium: Precolonial Africa
4-5 units, Aut (R. Roberts) Th 2:15-5

349B. Graduate Colloquium: African Social History Workshop
1 unit (R. Roberts) not given 1994-95

447. Graduate Seminar: East Africa in Transition: 1880s-1920s
4-5 units (Jackson) not given 1994-95

447A. Graduate Seminar: Fieldwork Seminar in Africa — Oral History, Life, and Family
5 units (Jackson) not given 1994-95

448A. Graduate Seminar: Colonial States and Societies in Africa
8-10 units, Win, Spr (R. Roberts) Th 2:15-5:05

LINGUISTICS

288A, B, C. Structure of Dagaare
288A. 2-3 units, Aut (Bodomo)
288B. 2-3 units, Win (Bodomo)
288C. 2-3 units, Spr (Bodomo)

288A, B, C. Advanced Arabic
288A. 2-3 units, Win (Bodomo)
288B. 4 units, Spr (Bodomo)

LANGUAGE PROGRAMS

606A, B, C. Beginning Swahili
606A. 4 units, Aut (Mugane)
606B. 4 units, Win (Mugane)
606C. 4 units, Spr (Mugane)

607A, B, C. Intermediate Swahili
607A. 3 units, Aut (Mugane)
607B. 3 units, Win (Mugane)
607C. 3 units, Spr (Mugane)

608A, B, C. Advanced Swahili
608A. 3 units, Aut (Mugane)
608B. 3 units, Win (Mugane)
608C. 3 units, Spr (Mugane)

613A, B, C. Intermediate Wolof
613A. 3 units, Aut (Staff)
613B. 3 units, Win (Staff)
613C. 3 units, Spr (Staff)

620A, B, C. Beginning Arabic
620A. 4 units, Aut (Barhoum)
620B. 4 units, Win (Barhoum)
620C. 4 units, Spr (Barhoum)

621A, B, C. Intermediate Arabic
621A. 4 units, Aut (Barhoum)

621B. 4 units, Win (Barhoum)
621C. 4 units, Spr (Barhoum)

622A, B, C. Advanced Arabic
620A. 4 units, Aut (Barhoum)
620B. 4 units, Win (Barhoum)
620C. 4 units, Spr (Barhoum)

POLITICAL SCIENCE

116L. The Social Foundations of Democracy —
(Same as Sociology 112/212.)
5 units, Spr (Diamond)

118A. Political Change in Tropical Africa
5 units (Abernethy) given 1995-96

118B. The Politics of Race and Class in Southern Africa
5 units, Spr (Abernethy)

PORTUGUESE

184. Lusophone Oral Literature
3-5 units, Aut (Carvalho)

AMERICAN STUDIES

Administrative Committee: (Chair) Albert Gelpi (English); Barton Bernstein (History), Rudy Busto (Religious Studies), Joseph Corn (American Studies Program Coordinator), Wanda Corn (Art), George Fredrickson (History), Richard Gillam (American Studies Program Coordinator), Alexander Nemerov (Art), Horace A. Porter (English, and African and Afro-American Studies), Jack Rakove (History), Karen Sawislak (History), William Solomon (English)

The American Studies program is administered through the Department 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 on Perspectives on American Identity (formerly "The American Character") that explores the tension between commonality and difference, 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 fourteen (or more) courses totaling at least 60 units. All are to be taken for a letter grade. Study plans must emphasize one of three general concentrations or areas of interest (Thought and Imagination, Social Organization and Behavior, and Policy and Institutions) and satisfy the following requirements:

Distribution of Courses — All students must take a minimum of five courses in their primary concentration, plus at least three courses in each of the other two areas. Of these eleven courses, three are specifically required of all students: American Studies 150 in the Thought and Imagination concentration and History 165A and 165B in the Social Organization and Behavior concentration. All majors are expected to obtain a solid grounding in their five-course concentration. For those concentrating on Policy and Institutions, this ordinarily means taking Political Science 1 and 10 as two of the five courses in their concentration.

Seminars — In addition to satisfying the 5-3-3 course concentration requirements described above, all majors must take American Studies 200, Perspectives on American Identity, and a second seminar (or colloquium) requiring a substantial paper. Ideally, American Studies 200 should be taken as soon as possible after declaring the major. Students who complete more than the two required seminars may count any additional seminars under the appropriate concentrations. Most courses that fulfill the second seminar requirement are so noted in the up-to-date list available at the program office. There may be other courses that also fulfill this requirement; students should consult one of the program coordinators. Seminars taken at Stanford in Washington also fulfill the second seminar requirement.

Race and Ethnicity Component — All students must take American Studies 164. This course, like the two core seminars, is to be taken in addition to the eleven courses that fulfill the 5-3-3 distribution requirement. Majors must also take a second race and ethnicity course as part of their eleven course, 5-3-3 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.

HONORS PROGRAM

Preferably during the junior year and no later than the second week of the third full quarter before graduation, majors with a letter grade indicator (LGI) of 3.5 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. The program may approve or disapprove 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.

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 Distribution Requirements notations. See the Time Schedule each quarter for changes in listings. An up-to-date list is available in the Program Office.

CORE LECTURES

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. Close textual readings are supplemented with discussions of the intellectual, theological, and political history of the period. (Thought and Imagination)

5 units, Win (Fliegelman)

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. (Thought and Imagination or Social Organization and Behavior.)

5 units, Win (Gillam)
152. Introduction to Material Culture — (Same as History 152; Science, Technology, and Society 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. (Thought and Imagination or Social Organization and Behavior)
   5 units, Spr (J. Corn)

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. (Social Organization and Behavior or Policy and Institutions) DR:9(5)
   5 units, Aut (Friedman)

RACE AND ETHNICITY
164. Introduction to Race and Ethnicity in the American Experience — (Same as Chicano Studies 164, History 164.) Required of all majors (does not count toward concentration). How factors of race 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. DR:3
   5 units, Spr (Fredrickson, Gutierrez)

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.

SEMINAR ON PERSPECTIVES ON AMERICAN IDENTITY
   5 units, Aut (J. Corn)
   Spr (Gillam)

AMERICAN THOUGHT AND IMAGINATION
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.”

AFRICAN AND AFRICAN-AMERICAN STUDIES
105. Introduction to African and Afro-American Studies
   ART
130. Art in America and Britain, 1670-1825: Culture and Politics
130A. Art in America, 1825-1910: Culture and Politics
231B. Colloquium: Readings in 19th-Century American Popular Culture
232E. Seminar: Interpretation and History — The Art of Benjamin West
232F. Undergraduate Seminar: Interpretation and History — Hollywood Film, 1939-1955
233C. Post WWII Transnational Art and Culture: Black and Jewish Diasporas in the U.S.
233D. Undergraduate Seminar: Feminist Theory, Women Artists, and Contemporary Art History

CHICANO STUDIES
110. Introduction to Chicano Life and Culture — (Same as Religious Studies 143, Spanish 180.)

COMPARATIVE LITERATURE
196. Modern Chicano/a Fiction

DRAMA
65. American Musical Theater
154. 20th-Century American Theater
156. Contemporary Ethnic Drama

ENGLISH
112. Masterpieces of American Literature
123. American Romanticism, Literature, and Painting
127B. Melville
159. African-American Poets
161C. 20th-Century Afro-American Fiction
162. Language and Gender in American Fiction
168A. 20th-Century American Indian Writing
179B. Faulkner
186B. Seminar: American Realism and Naturalism
186H. Seminar: American Religions and American Literatures
187C. Seminar: William Carlos Williams: His Work and Influence
187D. Seminar: Modern British and American Poetry
187H. Seminar: Black Popular Culture
187P. Seminar: The Contemporary American Short Story
220. Colloquium: American Indian Cultural Studies
229A. Colloquium: Death and the Grotesque in Nature and African-American Literature
229C. Colloquium: Innovative American Fiction Since 1945

MUSIC
5A. Music in America
5E. African American Women Making Music: Voices and Images of Change

RELIGIOUS STUDIES
8. Religions in America
53. Jews and Judaism in America
146. Christian Fundamentalisms
276. Topics in Race and Religion

SPANISH
285. Chicana Expressive Culture

AMERICAN SOCIAL ORGANIZATION AND BEHAVIOR
120. The Process and Practice of Community Service — Examines values, traditions, policies, and politics of community service. Topics: social responsibility; altruism v. 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 — (Same as Law 106, Political Science 182F.) See "Core Lectures."

214. The American 1960s: Thought, Protest, and Culture
3 units, Aut (Gillam)

ANTHROPOLOGY
103A. The Battle of the Little Bighorn in Anthropological Perspective
251B. Cultural Citizenship

ECONOMICS
116. American Economic History

EDUCATION
105. American Education and Public Policy — (Same as History 158B, Political Science 186K.)
165X. History of Higher Education in the U.S.
201. History of Education in the United States — (Same as History 158.)

HISTORY
56S. Introductory Seminar: Advertising and Consumer Culture in the United States
115. Technology and Culture in 19th-Century America — (Same as History and Philosophy of Science 121; Science, Technology, and Society 121.)
134A. The Industrial Revolution: Historical and Cultural Perspectives
159. Introduction to Asian American History
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
173B. U.S. Women's History, 1820-1980
234A. Undergraduate Colloquium: Technology in 20th-Century America and Europe
250A. Undergraduate Colloquium: The Constitution in American Politics
254S. Undergraduate Research Seminar: U.S. Women's History
264S. Undergraduate Research Seminar: The Papers of Martin Luther King, Jr. and the Modern Civil Rights Movement
265. Undergraduate Colloquium: New Research in Asian-American History
266. Undergraduate Colloquium: The Historical Study of Cities
276. Undergraduate Colloquium: The Creation of North America

LINGUISTICS
159. Language and Culture Among Urban Youth — (Same as Anthropology 170A.)
SOCIETY
145. Race and Ethnic Relations

AMERICAN POLICY
AND INSTITUTIONS
179. Introduction to American Law — (Same as Law 106, Political Science 182F.) See "Core Lectures."

COMMUNICATION
1. Mass Communication and Society
110. Communication and Law
125. Perspectives on American Journalism

EDUCATION
105. American Education and Public Policy —
(Same as History 158B, Political Science 186K.)

POLITICAL SCIENCE
1. Major Issues of American Public Policy
10. American National Government
60. The American Dream
61. American Political Thought
101 P. Politics and Public Policy -
(Same as Public Policy 101.)
126K Seminar: The United States and Central America
134B. America and the World Economy
134P. The Role of Technology in National Security
162. Seminar: Capitalism and Democracy
162M. Research Seminar: The American Dream
171. Judicial Politics and Constitutional Law: Civil Liberties
186. Urban Politics and Policy
187. Introduction to the Politics of Education
190A,B. Seminar: Voting Research
195. Seminar: Race and the American Creed
196. Seminar: Issues of Race in American Politics

INDIVIDUAL WORK
195. Directed Research
1-5 units (Staff) by arrangement
199. Directed Reading
1-5 units (Staff) by arrangement

250. Honors Project — Prerequisite: consent of department chair.
1-15 units, any quarter (Gelpi)

ANTHROPOLOGY
Chair: Renato I. Rosaldo
Associate Professors: James A. Fox, Joan H. Fujimura, John W. Rick
Assistant Professors: Carol L. Delaney, Paula Ebron, Akhil Gupta, Purinma Mankekar
Affiliated Faculty: Shirley Brice Heath (English), Susan Cashion (Dance Division), Raymond McDermott (Education), Thomas P. Rohlen (Education)
Consulting Assistant Professor: Dominique Irvine
Lecturers: Deborah Amory, Hill Gates, Andrea Klimt, Bill Maurer, Joel Streicker
Teaching Fellows: Margaret Karalis, Lynn Meisch

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 personhood; (2) provide undergraduate majors in anthropology 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 Comparative Cultural Studies of differences of race, class, national origin, gender, sexual orientation, and religion as shaped by experiences of education, history, and migration through which people in contemporary societies define themselves in relation to others. This can be pursued through the curriculum and degree requirements described below.

A second focus on Human Biocultural Evolution (HBE) emphasizes biological and cultural aspects of human evolution and their interaction during the last few hundred thousand years. Coursework and training is provided in paleoanthropology, prehistoric archaeology, and evolutionary theory with attention to the origins and biocultural evolution of modern Homo sapiens. The department is developing HBE in collaboration with the Program in Human Biology. This focus can be pursued in undergraduate or master's level
study under current guidelines. The requirements for doctoral study in this area are under development.

The Department of Anthropology 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 objects are used in anthropology courses and are exhibited in the Felix M. Keising Museum (room 111K) in the Department of Anthropology.

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 anthropology with a selection of courses from economics, history, political science, psychology, and sociology. Students who want a program that includes 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 Anthropology 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 Committee for initial academic advising and assistance in choosing an appropriate adviser in the department.

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 student program coordinator’s office. It is the student’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 tentative list of courses worked out with a faculty adviser and a brief statement that presents an intellectual rationale for the proposed program of study. Application forms may be obtained from the student 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 letter grade indicator (LGI) 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. 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 department.

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 additional 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 four 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, 187); (5) Biological or Biocultural Evolutionary Anthropology (5, 6, 180B, 180C, 181, 181A, 194). 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 archaeology, biological anthropology, anthropological linguistics, and specialized areas within sociocultural anthropology such as health and nutrition, gender studies, economic devel-
opment, 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.

**Honors Program in Anthropology** — 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 95, Honors Program Directed Individual Study, for as many as 15 units, but may not count more than 5 of those units toward the 60-unit degree requirement.

All required units for undergraduate programs must be passed with an LGI of ‘C’ or better, and not more than 8 (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 departmental activities and to attend the department’s biweekly colloquia (Mondays) and other presentations. Specific dates and topics are posted in the department.

**GRADUATE PROGRAMS**

University requirements for the degrees of Master of Arts and Doctor of Philosophy are described in the “Advanced 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 “Advanced Degrees” section of this bulletin and consult with the student program coordinator in the department. Other prospective students should request application materials from Graduate Admission, 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 an LGI of ‘B’ or better in each course. Thirty-six of those units, which constitutes the University minimum for the A.M. degree, must be at or above the 100-level, and 18 of the 36 must be 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 Human Biocultural Evolutionary Studies, 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 Admission, 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 final date 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 matriculating 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 Thought (either 290 or 291; 290 in the case of doctoral concentration in Human Biocultural Evolution);
   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 Human Biocultural Evolution, 284 must be completed before the end of the second year;
   b) the Proposal Writing Seminar (Anthropology 294); and
   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 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 Autumn Quarter of the third year (or earlier).
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.

HUMAN BIOCULTURAL EVOLUTION

The department is developing a doctoral degree program in Human Biocultural Evolution, emphasizing biological and cultural aspects of human evolution and their interaction during the last few hundred thousand years. Undergraduates and master’s candidates can pursue study in this area under the degree guidelines described in previous sections. Guidelines and curriculum for the doctoral program are under development.

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 an LGI of ‘B’ or better. All course work for a minor may not 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

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 Anthropology 1, 3, 5 and 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 are used in the presentation of culture case studies illustrating basic principles of cultural process. DR:2(*) or DR:9(4* or 5*)

5 units, Aut (Amory)  
Spr (Gibbs)

2. Human Prehistory — The aims, methods, and data of prehistoric archaeology. The development of human society 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. DR:9(5*)

3-5 units, Aut (Rick)

3. Language and Culture — Introductory lecture on language in its cultural setting. Comparative approach, using examples from many languages. Concentrates on analysis of monographic studies of (generally non-Western) speech communities. Topics: the theory of signs, the ethnography of speaking, registers, speech acts and pragmatics, conversation and discourse analysis, ethnoscience, ethnopoetics, world view and grammatical categories, encodability and language adaptivity, writing and literacy, and nonverbal communication. DR:9(4 or 5)

4-5 units, Spr (Fox)
5. Biology and Evolution of Language — (Same as Human Biology 113.) 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. Contrasts disorientation and reorientation with that experienced by anthropologists entering another culture and provides a means for considering the ways humans orient themselves, in space and time, with the body and structures of everyday life, by means of language, and in terms of the symbols and frameworks of myth and religion. Lectures, discussions, and mini-fieldwork projects develop an anthropological approach to the study of culture. DR:9f(5)

5 units, Win (Klein)

7. Investigating Culture: Introduction to Anthropology — Elements of everyday life are used as clues for investigating the implicit premises and explicit forms of culture, revealing its meaningful and constructed nature. Drawing on the common experience of entering the university, compares and contrasts disorientation and reorientation with that experienced by anthropologists entering another culture and provides a means for considering the ways humans orient themselves, in space and time, with the body and structures of everyday life, by means of language, and in terms of the symbols and frameworks of myth and religion. Lectures, discussions, and mini-fieldwork projects develop an anthropological approach to the study of culture. DR:9f(5)

5 units, Aut (Delaney)

8,9,10. Origins, Encounters, Identities — The sequence fulfills the Cultures, Ideas, and Values 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 constructed 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. DR:1 (three-quarter sequence)

5 units, Aut (Fox)

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 through the Enlightenment and under 19th-century liberalism, and in the legacy and experience of California’s populations. 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. DR:1 (three-quarter sequence)

5 units, Spr (Yanagisako)

11C. Gender in Cross-Cultural Perspective — (Same as Feminist Studies 140.) Overview of anthropological theories of gender constructions. Recent questions posed to anthropologists about representation, power, and 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. DR:2f(*) or 9f(5)*

5 units (Ebron) not given 1994-95

12. Introduction to Feminist Studies: Issues and Methods — (Same as Feminist Studies 101.) Under-
standing the creation and perpetuation of gender inequality. Topics: sexuality, reproduction, work, family, welfare, violence, language, and religion. Examples from non-western societies illuminate the cultural and historical construction of gender in western society. DR:9↑(5)

5 units, Win (Delaney)

14. Cultures in Crisis — Worldwide demise of tribal groups and peasant communities facing massive cultural change wrought by political and economic expansion from “centers.” Processes leading to the current situation. Global and national factors of local problems. Seminar with maximum student participation. Enrollment limited to 15. DR:2(*)

5 units (Befu) not given 1994-95

17. Astronomy and Culture — Cross-cultural historical examination of a variety of astronomical systems, focusing on the relations among conceptual systems, cultural practices, and empirical reality. Comparison of ancient Maya calendrical astronomy, Pacific Islanders’ navigational astronomy, and ancient and Medieval Western astronomy.

5 units (Fox) not given 1994-95

18. Writing and Literacy — Introduction to the origins, evolution, and diffusion of writing, its relationship to speech, and its role in culture and civilization. Archaeological decipherment, major writing systems of the world, scribal practice, and current issues and problems in literacy.

4-5 units (Fox, McDermott)

not given 1994-95

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 attention to the preparation of materials useful to the subject community. Prerequisite: introductory course in linguistics.

5 units (Fox) not given 1994-95

73A,B,C. First-Year Yucatec Maya — For beginners. Introduction to the language of the Maya of Yucatan, Mexico. Emphasis on modern Yucatec, with some attention to colonial and pre-Columbian writings.

3 units (Fox) by arrangement

74A,B,C. Intermediate Yucatec Maya

3 units, Aut, Win, Spr (Fox) by arrangement

75A,B,C. First-Year Classical Nahuatl — For beginners. Introduction to the language of the Aztecs of colonial Mexico.

3 units (Fox) by arrangement

76. Intermediate Classical Nahuatl

3 units (Fox) by arrangement

77A,B,C. First-Year Quechua — For beginners. Introduction to the language of the Inca and their descendants in the Andes of Peru, Bolivia, and Ecuador. Emphasis on modern spoken Quechua.

3 units (Fox) by arrangement

78. Intermediate Quechua

3 units (Fox) by arrangement

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 non-western societies. Writing focus course. Enrollment limited to 20.

5 units, Win (Ebron)

Spr (Mankekar)

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, Spr (Rick)

93. Pre-Field Research Seminar — Prepares students for anthropological field research in other societies and the U.S. Instruction in data collection techniques including participant observation, interviewing, surveys, sampling procedures, life-histories, ethnohistory, and 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 (Meisch)

94. Post-Field 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 and power issues in fieldwork and ethnographic writing, thus setting research write-up concerns within broader social and political contexts. Objective: produce an excellent ethnographic report based on original field research.

5 units, Aut (Gibbs)

95. Honors Program — Directed independent study and honors thesis work for students admitted to program.

any quarter (Staff) by arrangement
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) by arrangement

98A. Maya Mythology Multimedia Project — Sophomore seminar on the mythology of the ancient Maya, focusing on the Quiche Maya mythological text, *Popol Vuh*, and related artifacts from Maya art, including hieroglyphic inscriptions and ceramic vessels from Classic-era tombs. Group and individual projects are designed to be part of a multimedia program for elementary school to college and continuing education.

5 units, Aut (Fox)

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 (Karalis)

UNDERGRADUATE AND GRADUATE AREA STUDIES

102. Native American Cultures of North America — Introduction to diverse cultures of indigenous peoples who made N. America their home before European conquest. Lectures, readings, and films cover the precontact situation, postcontact changes (including government policies), influences of Indian culture on American society and culture, and the contemporary situation of native peoples. A good antidote to TV and movie Western stereotypes. DR:2(*) or DR:3(*)

5 units (Barnett) not given 1994-95

102A. Native Peoples and Cultures of the Southwest — The development of the rich, varied cultures of the American southwest from earliest prehistory to postmodern times. Emphasis on the interaction of cultures, and their responses to changes in social and natural environments. Recommended: background in Native American cultures or literature and/or archaeology. DR:2(*) or 3(*)

5 units (Barnett, Rick) not given 1994-95

103. Mesoamerican Communities, Ethnicities, and Nations — Survey of Mayas, Aztecs, and their prehistoric neighbors; of how they fared under Spanish colonial rule; and of their descendants today. Emphasis on highland Maya of Southeast Mexico. DR:2(*)

3-5 units (G. Collier) not given 1994-95

103A. The Battle of the Little Bighorn in Anthropological Perspective — Lecture/discussion focusing on the Battle of the Little Bighorn as a vantage point for an examination of racial and ethnic relations on the Western frontier. Events leading up to the battle, the course of the battle, and its mythologization in American folk culture. The Northern Plains environment of Sioux, Cheyenne, and Crow cultures, and of military culture and the political context of the Indian Wars. Optional summer field trip to the Northern Plains (extra expense, limited capacity). Enrollment limited to 25.

5 units, Spr (Fox)

107. Maya Mythology and the *Popol Vuh* — Introduction to the mythology of the ancient and modern Maya, emphasizing the Quiché Maya colonial mythological text (the *Popol Vuh*) in light of associated colonial documents, modern ethnography, and ancient Maya art. Discussion of theories of myth, including classic works of Frazer, Freud, Jung, Malinowski, Lévi-Strauss.

5 units (Fox) not given 1994-95

108. African Societies in a Changing World — Lectures, discussion, and films introduce the social institutions and cultural forms of Black Africa in the wider context of colonialism, political independence, and national strategies of development. Topics: subsistence patterns, art, shifts in patterns of marriage and family life, the emergence of new classes, the impact of Islam and Christianity. DR:2(*) or DR:9(5*)

5 units (Gibbs) not given 1994-95

108B. Africa: Gender and Representation — (Same as Feminist Studies 134B.) Survey of recent gender theory as it applies to Africa. The ways anthropologists, feminist theorists, and African intellectuals present issues of gender. Gender as a category of analysis through which other forms of social inequality are illuminated.

5 units (Ebron) not given 1994-95

109. Dance and Culture in Latin America — (Same as Dance 177.) Selected dance cultures of Latin America viewed as aspects of human behavior. Emphasis on cultural influences (European, African, and indigenous) which have shaped ritual and social dance forms of Mexico, Cuba, Brazil, Puerto Rico, Argentina, and Chile. DR:2(*) or 7(2*)

3-4 units, Spr (Cashion)

114. Introduction to Chinese Society — Introduces pre- and post-revolutionary Chinese society through selected topics including marriage, ancestor worship, foot-binding, regional variation, collectivization, birth control, and rural development. Guest lectures. DR:2(*)

5 units, Win (Wolf)

117. Society in Traditional China — The social structure of late traditional China. Implications for anthropological and sociological theory and for the understanding of China prior to the 1949 revolution. Topics: social stratification, the social organization
of production and exchange, marriage and the family, lineage and community organization, fertility and mortality, and the sociological aspects of religion and ritual. DR:2.*(*) or 9.*(*)
5 units, Win (Gates)

118A. 20th-Century Chinas—Open to graduate students and upper-level undergraduates. The variations in Chinese culture that have arisen through industrialization, imperialism, alternative forms of nation building in China and Taiwan, the socialist experiment, and integration with world capitalism since the 1940s. Continuities and fundamental changes in Chinese culture as seen through the social organization of production and exchange; the state and its ideologies; social stratification; marriage, kinship, and gender; population growth and migration; and popular systems of belief. DR:2(*) or 9(5*)
5 units (Gates) not given 1994-95

5 units, Win (Gupta, Mancall)

121. Japanese Society and Culture—Japan's prehistory and its relation to neighboring areas. Institutional framework, and social and psychological background for development of the individual and gender differences in modern Japan. Critique of several models of Japanese society. Opportunities for reading in special subject areas. DR:2(*)
5 units, Spr (Befu)

123. Japanese Economic Organization—Social and cultural factors in Japanese economic organization and business management, motivational basis for commitment to work, relation of kinship to economic system, "industrial gradation" and its correlates. DR:2(*)
5 units (Befu) not given 1994-95

125. Japanese Woman Through Novels—In anthropological literature on Japan, women tend to be relegated to the background of the social stage. Through analysis of novels written by Japanese women, in conjunction with anthropological literature, a new understanding of the position of women in Japan is presented.
5 units (Befu) not given 1994-95

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), DR:2(*)
5 units (Delaney) not given 1994-95

SOCIAL AND CULTURAL ANTHROPOLOGY

128. Ethnographic Film—(Same as Communication 115.) The ethnographic film as a documentary form examined through viewing and analysis of classical and current films. Comparison of film and video tapes with written monographs as a tool for understanding and representing culture. Film as a vehicle for anthropological research. Issues of authenticity and legitimacy in representing cultures. Recommended: 1. DR:9(5)
5 units, Win (Gibbs)

130. Film Images of African-American Culture—(Same as African and Afro-American Studies 122, Communication 138.) The nature of the images of African-Americans and African-American culture as portrayed on film. The sources of those images (including the sources in African-American culture itself); their variations; and how they have changed over time. Historical trends are related to changes in overall American race relations and American popular culture, including the filmic media. Links to African-Americans' self-conceptions and their status and power in American society. DR:3
5 units (Gibbs) not given 1994-95

133A,B,C. Ethics of Development in a Global Environment (EDGE)—(Same as Engineering 297A,B,C, Political Science 140A,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 "Wealth, Freedom, and Health": development models, comparative national health, AIDS, control of wealth, India-China-Africa America today. Speakers from Stanford and other institutions are experts who directly deal with world policy makers through research and advisory activities.
1-4 units, Aut, Win, Spr (Lusignan, Packenhem, Gupta)
lecture W 7:30-9:30 p.m.
workshops by arrangement

136. Culture and Learning—(Same as Education 287X.) 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 organ-
nize 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.

3 units, Spr (McDermott, Rohlen)
Sum (Baugh, McDermott)

140. Aging: From Biology to Social Policy — (Same as Human Biology 178.) 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. Those with strong clinical interests should enroll in Medicine 210. DR:9(5)
3-5 units, Spr (Barnett)

144. Critical Perspectives in Feminist Theory — (Same as Feminist Studies 102A.) Advanced undergraduate seminar. Focuses on current dialogues in feminist theory regarding questions of identity, location, subjectivity, and political strategy. Challenges to universalizing theories of gender are examined through a three-way conversation between different strands of feminism, Marxism, and postmodernity. Enrollment limited to 20. Prerequisite: 12 or Feminist Studies 101.
5 units (Yanagisako) not given 1994-95

144A. From Theory to Praxis — (Same as Feminist Studies 103D.) Seminar puts into practice feminist theories of subjectivity, location, power, political action. Students work in coordinated research and action projects focused on a cluster of interrelated policy issues, including adequate and affordable childcare, the protection and support of domestic service workers, and gender issues in immigration policy. Enrollment limited to 20. Prerequisite: Feminist Studies 102 or consent of instructor.
5 units, Win (Yanagisako)

147. Cultural and Feminist Perspectives on Theology — (Same as Feminist Studies 168.) Introduces basic assumptions, approaches, paradigms, and critiques which feminist thinkers brought to bear on traditional Christian theology. Readings on feminist theologians who made major contributions to feminist hermeneutics, Biblical studies, images of God, and theories of redemption and liberation which analyze the role of anger, violence, and exploitation in the exclusion of women from central positions in the Christian church community. DR:9(5)
5 units, Aut (Akiyama)

149A. Peasant Society: Economy and Environment — (Same as Human Biology 182.) Until WWII, peasants were a majority of the population. Now they are a minority everywhere except in S. and E. Asia and sub-Saharan Africa. Despite this transformation, peasant and semi-proletarian populations in rural Asia, Latin America, and Africa number some two billion people. Core seminar explores interdisciplinary peasant studies literature and a political economy approach to agrarian change. Student research projects are on a question situated in a specific social context, and relating to food, forests, technology, or water. Prerequisite: course on developing world.
4 units (Crow) not given 1994-95

151. Cultural Citizenship — Exploration of inequality and cultural differences in the U.S. Can people be different and belong too? Interdisciplinary study of selected examples.
5 units (Rosaldo) not given 1994-95

151A. Comparative Cultural Studies — For upper-division undergraduates. The meanings of culture, from anthropological notions to contemporary social theories of mass/public culture. The relationship between popular culture and populist connections—the use of popular culture to build community ties and national and global constituencies, through social difference. How class, gender, ethnic distinctions are created through production and consumption of various cultural practices. DR:9(5)
5 units, Spr (Ebron)

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. DR:8(3)
5 units (Delaney) not given 1994-95

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 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. DR:8(3)
5 units (Delaney) not given 1994-95

155A. Cultural Psychology — (Same as Psychology 108.) Cultural psychology, the study of the ways the mind and culture create and sustain one another, is an interdisciplinary subfield emerging at
the interface of psychology, anthropology, and linguistics. The cultural sources of diversity in thinking, emotion, motivation, self personality, morality, development, and psychopathology. Culture defined as the shared ideas and practices associated with ethnicity, gender, religion, social class, birth cohort, period in history, region of the country, or part of the world.

3 units, Spr (Markus)

158. The Sociology of Scientific Knowledge—
( Same as History 133B, History and Philosophy of Science 155.) 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 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 Pierre Bourdieu, Mary Douglas, and others, a theory of practice and a critique of historically situated practical reason is explored as the foundation of the sociology of scientific knowledge.

4 units (Lenoir, Fujimura) not given 1994-95

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 Feminist Studies 147A, History and Philosophy of Science 160; Human Biology 170.) 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. DR:2(3) or 9(5)

5 units, Aut (Fujimura)

161A. Conservation and Community Development in Latin America—
( Same as Human Biology 139, Latin American Studies 196.) The problems and potentials for linking management of protected areas (parks, reserves, wildlife sanctuaries, etc.) with local community development in Latin America. Case studies include national and private parks in Costa Rica, and biosphere reserves in Central and S. America. Emphasis on the impact of Western conservation efforts on indigenous peoples and the ways such efforts might be carried out with social, cultural, and economic benefits at the local level.

3-5 units, Win (Durham, Irvine, Umaña)

162A. Topics in Socio-Cultural Studies of Biotechnology—
( Same as History and Philosophy of Science 162, Human Biology 164.) Current literature in socio-cultural 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.

5 units, Win (Fujimura)

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. DR:2(*) or DR:9(5*)

3-5 units (Staff)
alternate years, given 1995-96

165. Psychological Anthropology—
Introduction to contemporary themes in the anthropological study of cultural influences on psychological development and functioning. Topics: socialization, personality assessment, national and ethnic character, gender differences, abnormality and deviance, culture change, and the influence of personality on cultural institutions. Prerequisite: 1 or Psychology 1 or consent of instructor. DR:2(*) or DR:9(4*)

3 or 5 units (Gibbs) not given 1994-95

167. Ethnography of Communication—
( Same as Linguistics 147.) Language use in situations, organizations, and by members of different cultures. Speech events and the role of conversation, narratives, and performance modes in different contexts. Focus is on ethnographic methods for the study of verbal and non-verbal communication.

4 units (Heath) given 1995-96

168. Medical Anthropology—
( Same as Human Biology 168.) 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).

169. Indigenous Peoples and Environmental Problems — (Same as Latin American Studies 129, Human Biology 149.) Upper-division undergraduate. The human consequences of contemporary environmental problems. The impact of market economies, "development" efforts, and conservation problems on indigenous peoples, emphasizing the Amazon, E. Africa, Alaska, and Central America. The role of indigenous grass roots organizations in combating environmental destruction and degradation of homeland areas. Enrollment limited to 60 by consent of instructors.

3-5 units (Durham, Sawyer) not given 1994-95

LINGUISTIC ANTHROPOLOGY

170A. Language and Culture Among Urban Youth — (Same as Linguistics 159.) Sociocultural and linguistic studies through which urban youth have been defined and debated. Gang histories and structures, ghetto and project life, socialization of children and youth, and aesthetic expression (graffiti, vernaculars, music, drama, and pictorial art.) Case study with investigations of language and culture patterns within institutions (e.g., families, schools, youth groups, (including Boys' and Girls' Clubs, neighborhood basketball leagues, etc.), and "service" agencies. Emphasis on U.S. youth, with comparative perspectives from other nations, especially with respect to language socialization.

5 units, Win (Heath)

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 1994-95

173. Maya Hieroglyphic Writing — Decipherment of the hieroglyphic writing of the ancient Maya. Written Maya, Maya civilization, and theories of writing and literacy. Cylindrical, astronomical, astrological, historical, and mythological texts. Writing on stone, wood, bone, shell, ceramic vessels, and screenfold books. Maya scribal practice and literacy. The origin of Maya writing, and introduction to related Mesoamerican writing systems.

5 units (Fox) not given 1994-95

ARCHAEOLOGY AND BIOLOGICAL ANTHROPOLOGY

180B. Beginning Human Osteology — Introduction to the study of human bones. Structure and function of bones, maturation and development of bones, and identification of the different bones in the human skeletal system. Methods and techniques for assessing the age and sex of human bones from archaeological and paleontological contexts.

5 units (Staff) not given 1994-95

180C. Advanced Human Osteology — Analysis of human bone remains from archaeological and paleontological sites. In-depth analysis of fragmentary remains of a collection of human bones from an archaeological site prior to their reburial. Analysis includes morphometric measurements of various skeletal elements, and assessments of the age, sex, and pathological conditions of individual specimens. Prerequisite: 180B.

5 units (Staff) not given 1994-95

181A. Human Evolutionary Genetics — (Same as Human Biology 114.) 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 1994-95

181B. Human Evolutionary Genetics — (Same as Human Biology 185.) 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, Aut (Mountain)

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. DR:2(*)

6-9 units (Rick) not given 1994-95
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 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. DR:3 6-9 units, Aut (Barnett)

184. Archaeological Data Analysis — The univariate, multivariate, and graphical methods used for analyzing archaeological and paleobiological data. Archaeological and paleontological examples illustrate various methods. Recommended: knowledge of algebra. 5 units, Spr (Klein)

185. Stone Tools in Prehistory — Archaeologists 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. 5 units (Rick) not given 1994-95

187. Hunter-Gatherers in Archaeological Perspective — (Same as Human Biology 183.) Organization and subsistence of band-level hunter-gatherers as approached through archaeological investigations. Modern hunter-gatherers provide background for prehistoric groups. The archaeological record of Africa, Europe, and the New World provides examples of how archaeological data reconstructs the cultural systems of extinct hunter-gatherers. DR:9(5*) 5 units, Win (Rick)

194. The Origins of Modern Humans — (Same as Human Biology 193.) 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 competing theories: that modern humans originated more or less simultaneously from non-modern humans in many regions of Africa and Eurasia; or that modern humans originated exclusively in Africa and spread from there, largely replacing non-modern humans elsewhere. 5 units (Klein) not given 1994-95

203. Culture and Power: Mesoamerica and Beyond — Focuses on indigenous peoples, examining their articulation in contemporary states in relation to ethnic consciousness and cultural processes. Limited enrollment, consent of instructor. Prerequisite: Spanish reading literacy. 5 units (G. Collier) not given 1994-95

223. Seminar on Japanese Anthropology — Anthropological issues and problems on Japan. Focuses on Nihonjinron (Japanese cultural identity). 5 units (Befu) not given 1994-95

232. Science, Technology, and Society — (Same as History and Philosophy of Science 232; Science, Technology, and Society 232.) Seminar examines science as social activity, exploring 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, Aut (Fujimura)

234. Seminar on African Law — (Same as African Studies 234.) African indigenous legal systems and their interaction with European law imposed during the colonial period and changing post-independence dynamics of that interrelationship. Focuses on law in Botswana and Liberia. Student paper may treat law in other African countries. 5 units, Win (Gibbs)

235. Mass Media and Subjectivities — (Same as Communication 234.) Graduate seminar on critical approaches to mass media and popular culture. Object is to collaborate in developing methodologies and critiques and to interrogate prevailing theoretical perspectives. Emphasis is on feminist perspectives, national and transnational circulation and reception of popular texts, questions of narrativity, identity and agency, and cross cultural conceptions of subjectivity. Evening sessions required. 5 units, Aut (Mankekar)

239. Cultural Approaches to Education and Development — (Same as Education 306C.) Education in the context of specific cultural and social environments. Anthropological perspective of assumptions about education’s role in the rise of industrialism, the establishment of the modern state, and the transformation of society by technology, ideology, and urbanism. Topics: cultural transmission and traditionalism, the local translation of modernization efforts, nationalism and culture, bureaucratic cultures, and educational ideology as a global phenomenon. 3-5 units (McDermott) not given 1994-95

RESEARCH METHODS

195. Museum Methods — Individually directed work on anthropology collections. Introduction to the computerized storage and retrieval system, cataloging, exhibit techniques. Can be taken for one or two quarters by arrangement with instructor. 1-4 units (Rick) by arrangement
242. Reading Theory Through Ethnography — Graduate seminar focusing on contemporary ethnography and related socio-cultural theories generated by texts. Topics: agency, resistance, identity formation, discourse analysis, etc.

5 units (Ebron) not given 1994-95

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 (Ebron) not given 1994-95

244A. Naturalizing Power: Kinship/Gender/Race/Sexuality — (Same as Feminist Studies 103H.) 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, Spr (Yanagisako)

245. Advanced Feminist Theory — (Same as Feminist Studies 103J.) Interdisciplinary graduate seminar examines cultural difference 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, Spr (Yanagisako)

246. 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. Analyzes 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, Win (Manekar)

248. Gender and Social Theory — (Same as Feminist Studies 148A.) 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 1994-95

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. How are our understandings of gender, race, capitalism, colonialism and the state transformed when we scrutinize the practices and subjectivities of those who are privileged by systems of social inequality? Topics: capitalists, transnational capitalist families, colonial administrators, male gender identity, white racial subjectivity, and physicists. Enrollment limited to 20.

5 units (Yanagisako) not given 1994-95

250. Nationalism and Gender — Examines 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 (Manekar) not given 1994-95

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) not given 1994-95

251B. Cultural Citizenship — Exploration of inequality and cultural differences in the U.S. Can people be different and belong, too? Interdisciplinary study of selected examples.

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 1994-95

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 (Delaney) not given 1994-95

256. Imaginary Homelands: Constituting Diasporic Communities—Graduate seminar focusing on meanings of identity and community in post-colonial and diasporic contexts. African, Asian, and Latino diasporas in the U.S., and African and Asian communities in Britain. Topics: nationalism in the post-colonial era; gender, class, and sexuality within diasporas; and relations between post-colonial intellectuals and domestic “minorities” in the U.S. Enrollment limited to 15.

5 units, Win (Ebron)

258. Ideology and Cultural Nationalism—Ideology understood in the broad sense to encompass “folk” and “hegemonic” ideology. Problems and processes of creating and maintaining cultural identity at the national level in relation to post-colonial nations and to older, established nation-states. Interplay of “ethnicity” of minority groups with national integration. Emphasis on cultural/symbolic processes rather than institutional/structural processes.

5 units, Aut (Befu)

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, Spr (Gupta)

263. Political Ecology—Graduate seminar focused on the causes and consequences of environmental degradation in diverse social and ecological settings. Emphasis 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, Spr (Durham)

264. Advanced Ecological Anthropology—Seminar 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 involution 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 1994-95

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 1994-95

266. Cultural Transmission: Education in Cross-Cultural Perspectives—(Same as Education 315.) 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, Win (G. and L. Spindler)

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, Spr (Barnett)

277. Linguistic Anthropology—(Same as Linguistics 255.) Seminar on language in its cultural context. Topics: similar to Anthropology 4 plus the roles of linguistic models in the social sciences and more thorough treatment of key terminological systems (e.g., kinship). Emphasis is on critical reading and discussion of landmark monographs and associated articles. The sequence of topics is motivated by the readings.

5 units (Fox) not given 1994-95


5 units, Win (Fox)

280. Ethnographic Approaches to Cultural Diversity in Schooling—(Same as Education 280.)
How to learn about culture and to analyze education-relevant situations such as the culturally diverse classroom. The cultural process is approached by (1) acquiring techniques of observation, interview, and interpretation of behavior in context, and soliciting and recording the “native” explanations of their own behavior; (2) developing an internally consistent conceptual structure that orients observation and elicitation productively; (3) being sensitized to one's own culture and how it influences perception and interpretation of behavior. Selected 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.

5 units, Aut (G. and L. Spindler, McDermott)

289. Anthropological Research Methods — Required for students in Ph.D. program in Anthropology. Practicum in anthropological field research methods, including: interviewing; observation; mapping; linguistic elicitation; use of film, video, and tape recording. Material on ethics of field research, pre-field, field and post-field; relationship of methods to research problems and data analysis; and procedures for maintaining physical and mental health in the field. Prerequisite for students not in Anthropology Ph.D. program: consent of instructor.

5 units, Spr (Befu)


5 units, Win (Gupta, Fujimura)

291. History of Anthropology: The 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, Win (Gupta, Fujimura)

292. Dissertation Seminar — For graduate students in the process of writing dissertations and preparing for professional employment.

Aut, Win, Spr (Delaney) by arrangement

293. Internship

any quarter (Staff) by arrangement

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 (Gupta)

295. First-Year Paper

2-3 units, Win, Spr (Befu) by arrangement

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, any quarter (Staff) by arrangement

297. Directed Individual Study — Opportunities for advanced students to explore special areas of interest.

any quarter (Staff) by arrangement

298. Teaching Assistantship — Supervised experience as assistant in one undergraduate course.

5 units, any quarter (Staff) by arrangement

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 (Klimt, Maurer)

299. A.M. Project—Research in connection with the master's paper.

any quarter (Staff) by arrangement

AFFILIATED DEPARTMENTAL OFFERINGS

AFRICAN AND AFRO-AMERICAN STUDIES

105. Introduction to African and Afro-American Studies

5 units, Win (Porter)

ART

233C. Post WWII Transnational Art and Culture: Black and Jewish Diasporas in the U.S.

4 units, Aut (Bloom)

CHICANO/A FELLOWS

110. Introduction to Chicano Life and Culture — (Same as Religious Studies 143, Spanish 180.)

5 units, Aut (Yarbro-Bejarano, Busto)

LINGUISTICS

60. Introduction to Language Change

4 units, Spr (Staff)

146. Language and Gender

4 units, Spr (Eckert)

PSYCHOLOGY

126/226. Culture and Self

3 units, Win (Markus)
SCIENCE, TECHNOLOGY, AND SOCIETY

270. Poverty, Technology, and Rural Industrialization
5 units, Spr (Crow)

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.

FLORENCE

141A. Renaissance Europe and the World's "Others" — DR:9
5 units, Aut (G. Collier)

157A. Issues in Italian Law
5 units, Aut (J. Collier)

APPLIED PHYSICS

Emeriti: (Professors) Marvin Chodorow, C. Chapin Cutler, Theodore H. Geballe, W. Conyers Herring; (Professors/Research) Bertram A. Auld, H. John Shaw; (Affiliated) William E. Spicer (Electrical Engineering)
Chair: Stephen E. Harris
Assistant Professor: Zhi-Xun Shen
Professors (Research): Philip H. Scherrer, Helmut Wiedemann, Herman Winick
Associate Professor (Research): Martin M. Fejer
Courtesey Professor: Douglas D. Osheroff
Courtesey Associate Professor: Bruce M. Clemens
Affiliated Professors: Gordon S. Kino (Electrical Engineering), Anthony E. Siegman (Electrical Engineering)
Acting Associate Professor: John D. Fox
Consulting Professors: Richard G. Brewer, Bernard A. Huberman
Consulting Assistant Professor: Shoucheng Zhang

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, the Ginzton Laboratory, the Hansen Experimental Physics Laboratory, the Solid State Electronics Laboratory, and the Stanford Synchrotron Radiation Laboratory.

The number of graduate students admitted to Applied Physics is limited. Applications should be received by January 1, 1995. 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 "Advanced 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) Electrodynamics — 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) or 1-unit seminar courses, to complete the requirement of 36 units.
4. A final overall average letter grade indicator (LGI) 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 "Advanced 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; Physics 201, 202, 203; Electrical Engineering 357; Materials Science and Engineering 161, 162, 163
   c) 24 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 LGI 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), the research adviser, and one other member 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: before the end of the Winter Quarter of the fourth year, 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.

* For students entering with an M.S. degree, requirements for item 1b may be totally or partly satisfied with equivalent courses taken elsewhere and requirements for item 1c are reduced to 18 units.

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


3 units, Win (Doniach)

during the last three weeks of 208. Limited enrollment. Prerequisites: some undergraduate-level device and circuit exposure.

207. 3 units, Win (Fox)

208. 3 units, Spr (Fox)


3 units, Spr (Shen)

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) by arrangement

291. Practical Training — Opportunity of practical training in industrial labs. Arranged by student with the research adviser's approval. A brief summary of activities required, approved by the research adviser.

1 unit, Aut (Staff) by arrangement


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. Material includes 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 quasilinear 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, Win (Sturrock) alternate years, not given 1995-96

315. Topics in Computational Physics — Computer simulation of physical systems at the microscopic level is an increasingly useful tool for understanding the physical world. Focus is on selected phenomena where simulation can complement experimental and analytic studies. Topics: few degrees of freedom — nonlinear dynamics and chaos; many degrees of freedom — thermal equilibrium, Metropolis algorithm, molecular dynamics; random systems — percolation, simulated annealing, neural networks, cellular automata; simulation of quantum systems.

3 units, Spr (Doniach)

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 (Staff) alternate years, given 1995-96

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 1995-96

enon. Prerequisites: undergraduate quantum mechanics and solid state physics.

3 units, Aut (Shen)


3 units, Win (Harrison) MWF 10


3 units, Spr (Harrison)


3 units, Win (Kapitulnik)


3 units (Harris) alternate years, given 1995-96


3 units, Win (Yamamoto)


3 units (Yamamoto) alternate years, given 1995-96

390. Dissertation Research
any quarter (Staff) by arrangement

453. Special Topics in Accelerator Physics — Research level discussions of current topics in accelerator physics. Content varies each quarter and year, depending on the interests of staff and students. Course may be repeated. Offered occasionally.


3 units, Aut (Chao)

453B. Microwave Linear Accelerators — For students with a general interest in electron linear accelerators, in electron linacs for free-electron lasers, or in future linear colliders. Review of beam transport and emittance concepts, electron injection (guns, bunching, and capture); accelerating structures; klystron theory and rf pulse compression; beam loading and wake potential concepts; introduction to advanced acceleration concepts, such as wakefield and plasma accelerators.

3 units, Win (Miller, Wilson)

470. Condensed Matter Seminar — Discussion of current research and literature in condensed matter physics offered by faculty, students, and outside specialists.

1 unit, Aut, Win, Spr (Harrison) Th 4
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. Physics of Strongly Correlated Electron Systems — Recent advances in the physics of strongly correlated electron systems: Kondo effect, heavy fermion physics, slave boson methods, models of high Tc superconductivity, fractional quantum hall effect, anyon representations.

3 units, Aut (Doniach)

473B. Current Topics in Condensed Matter Physics
1 unit, Aut (Kapitulnik)

483. Current Topics in Optics and Electronics — Weekly presentations and discussions of current research topics in lasers, quantum electronics, optics, and photonics by faculty, students, and invited speakers.
1 unit, Aut Win, Spr (Staff) M 4:15

AFFILIATED DEPARTMENT OFFERINGS

See respective department listings for course descriptions, units, days, times, instructors, quarter, and Distribution Requirement (DR) information.

ASTRONOMY

169A,B,C. Independent Study in Astrophysics and Honors Thesis
Aut, Win, Spr (Staff)

ELECTRICAL ENGINEERING

231,232. Lasers I and II — (380, 381)
231. 3 units, Aut (Siegman)
232. 3 units, Win (Siegman)

248. Fundamentals of Noise Processes — (389)
3 units, Aut (Yamamoto)

261. The Fourier Transform and Its Applications — (384)
3 units, Aut (Gray) Win (Nishimura)

346. Introduction to Nonlinear Optics — (382)
3 units, Spr (Harris)

357. Microstructures Fabrication Laboratory — (307)
3 units, Sum (Bloom, Khuri-Yakub)

366. Introduction to Fourier Optics — (385)
3 units, Win (Goodman)

PHYSICS

15B. Cosmic Horizons
3 units, Spr (Petrosian)

27. Evolution of the Cosmos
3 units, Aut (Wagoner)

50. Astronomy Laboratory and Observational Astronomy
3 units, Aut, Sum (Walker)

100. Introduction to Observational and Laboratory Astronomy
4 units, Spr (Walker)

160. Introduction to Stellar and Galactic Astrophysics
3 units, Aut (Romani)

161. Introduction to Extragalactic Astrophysics and Cosmology
3 units, Win (Petrosian)

172. Physics of Solids
3 units, Spr (Michelson)

181. Intermediate Optics
3 units, Aut (Byer)

210. Advanced Particle Mechanics
3 units, Aut (Peskin)

211. Continuum Mechanics
3 units, Win (Romani)

212. Statistical Mechanics
3 units, Spr (Susskind)

220,221. Classical Electrodynamics
220. 3 units, Aut (Fetter)
221. 3 units, Win (Fetter)

230,231,232. Quantum Mechanics
230. 3 units, Aut (Linde)
231. 3 units, Win (Linde)
232. 3 units, Spr (Linde)

301. Astrophysics Laboratory — Offered occasionally.
3 units, Sum (Walker)

320. Quantum Optics and Selected Topics in Atomic Physics
3 units, Spr (Chu) alternate years, not given 1995-96

321. Laser Spectroscopy
3 units (Kasevich) alternate years, given 1995-96

330,331,332. Quantum Field Theory
330. 3 units, Aut (Kallosh)
331. 3 units, Win (Kallosh)
332. 3 units, Spr (Kallosh)

360. Stellar Physics
3 units (Petrosian) alternate years, given 1995-96

362. High Energy Astrophysics
3 units, Spr (Petrosian) TTh 2:15-3:30 alternate years, not given 1995-96
The department offers courses of study in two areas: (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 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 should 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 the following: Art 1, 2, 3.
2. Forty units in art history courses, of which at least 32 must be 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 year of beginning French or German or Italian or present proof of reading ability in one of these languages. Students who intend to apply for graduate school in art history should become profi-
cient in two of the foregoing languages, one of which should be German. It is recommended that students who intend to apply to graduate school in Asian art should take first year Chinese or Japanese.

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.

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 department's academic secretary 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.

7. Recommended courses (but which do not count towards the major): Art 40, 50, or 53 and 70.

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 letter grade indicator (LGI) 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 will assign 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 "Advanced 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 a committee consisting of three members of the art history faculty. The process includes the evaluation of transcripts and records and a meeting (scheduled during the week prior to the opening of Autumn Quarter) with students 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 "Advanced 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.
Area Core Requirements — Every graduate student must participate in at least one 4-unit 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), will 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 (67 for design). 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.

Requirements for Painting/Drawing
Art 40, 50 or 53, 60.
Art 140, 141, 142 (these drawing classes need not be taken in sequence. Any of the drawing classes may be taken concurrently with Art 145, Painting I).
18 units of painting 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.  
Total units required: 57.

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.  
Total units required: 58.

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: 67.

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.  
Total units required: 55.

The above area requirements for a major are part of the total of 65 units. 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.

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 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: twenty slides of your 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.
3. 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.
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 full 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 Administrator for Programs 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 the equivalent 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 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 in Design are:
1. Completing a minimum of two years (six full 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 the equivalent 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 convenience.

Graduate students must remain in residence at Stanford for the duration of the program.

ART EDUCATION

Complete information concerning the A.M. in Teaching, Doctor of Education and 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.
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. DR:7(2)
   5 units, Aut (Nova)
   Spr (Marrinan)

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. DR:2(*) or 7(2*)
   5 units, Win (Takeuchi)

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. DR:7(2)
   5 units (Turner) not given 1994-95

10. Introduction to Art, Renaissance to the Threshold of the Modern Age: Important Events, Issues, and Personalities in European Art — Main currents in the history of Western art from the Renaissance to c. 1700. DR:7(2)
   4 units, Win (Miller)

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. DR:7(2)
   4 units (Maxmin) not given 1994-95

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.
   4 units (Takeuchi) not given 1994-95

13. Introduction to Chinese Art — Major themes and forms in Chinese art from the Neolithic period to the present. Architecture, ritual bronzes, sculpture, painting, calligraphy, and ceramics in their historical and cultural contexts.
   4 units (Vinograd) not given 1994-95

INTERMEDIATE

100A/200A. Ancient Art I — Greek art of the Archaic and Early Classical periods. Selective survey of the development of Greek art from Protogeometric beginnings to the decades preceding the age of Pericles. DR:7(2)
   4 units, Aut (Maxmin)

100B/200B. Ancient Art II — Greek art of the Classical and Hellenistic periods, emphasizing the formation, in 5th-century Athens, of the classical ideal and its development and diffusion in the centuries that followed. DR:7(2)
   4 units, Win (Maxmin)

100C/200C. Ancient Art III: Roman Art — Introduction to the rich and varied art and architecture of Rome from the Etruscans to the Late Empire.
   4 units (Maxmin) not given 1994-95

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, Spr (Maxmin)

103/203. Late Roman and Byzantine Empire — Art and architecture from Constantine (4th century) to the Turkish conquest of Constantinople (1452). Artistic traditions (mosaics, icons, manuscript illumination) and building types centered on patterns of ideology and patronage in Rome, Ravenna, Istanbul, Mt. Sinai, the Balkans, and Sicily. DR:7(2)
   4 units (Lewis) not given 1994-95

104/204. Early Middle Ages — Art and architecture in Western Europe from c. 700 to 1095, centered on the Celtic, Anglo-Saxon, Carolingian, Ottonian, 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 emerge, and remnants of the late classical tradition survive within larger ideological patterns of assimilation and change.
   4 units (Lewis) not given 1994-95

105/205. Age of the Crusades — Romanesque art and architecture in Western Europe from c. 1095 to 1200 developed to meet the expansionist demands of such movements and events as the Crusades, the Pilgrimage Roads, the Norman Conquest, and 12th-century humanism 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.
   4 units (Lewis) not given 1994-95

107/207. Age of Cathedrals — Gothic art and architecture in Western Europe from c. 1150 to 1500, viewed within the ideological framework of the new monarchical structuring of Church and State, the emerging towns and universities, the appearance of the Mendicant Orders, the rise of individualism and literacy, and the consequent shifts in patterns of art patronage and practice in Chartres, Paris, Bourges,.
During the 17th century, the focus was on the great person-tries: The Age of Rubens and Rembrandt.

Major artistic developments in the Low Countries focused on court patronage to enterpreneurial art markets and the new position of the artist in society, within the unstable ideological contexts of late medieval optimism, disillusionment, and pre-modern spiritual crisis on the Eve of the Reformation.

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110A/210A. The Origins of the Renaissance: Art and Architecture in Italy, 1200-1400 — Survey of this crucial period of transition between the Middle Ages and the Renaissance: the passage from an oral to a written tradition; the foundation of the Mendicant Orders; the emergence of the middle-class and of the art market; the development of new architectural typologies (e.g., the civic centers of the new public administration) and of new art forms such as the altarpiece which derive from the liturgical requirements approved by the Fourth Lateran Council in 1215. DR:7(2)

4 units (Nova) not given 1994-95

110B/210B. Early Renaissance Art, 1400-1480 — The principles and events of the Early Italian Renaissance. A study of method, iconographic conventions, symbolic images and meanings, patronage, and a critical analysis of the bibliography. Part I: Florence and Tuscany and the major role played by the International Gothic style. Part II: analysis of each area of the Italian peninsula, taking into account its history and political structure and showing how Italy's political fragmentation gave birth to different kinds of Renaissance. DR:7(2)

4 units (Nova) not given 1994-95

110C/210C. High Renaissance Art, 1480-1565 — The art of the Italian High Renaissance and the artists active during the period (Leonardo, Michelangelo, Raphael, Titian, Palladio, among others). Issues of patronage and social networks. DR:7(2)

4 units (Nova) not given 1994-95

111A/211A. Artistic Culture in Italy during the 17th Century: Caravaggio, Bernini, Borromini, and their Contemporaries — Important developments in painting, emphasizing Rome and Bologna; major trends of style and problems of iconography. DR:7(2)

4 units (Miller) not given 1994-95

112B/212B. Periods of the Baroque Art, 1530-1800 — The principles and events of the Early Italian Renaissance. A study of method, iconographic conventions, symbolic images and meanings, patronage, and a critical analysis of the bibliography. Part I: Florence and Tuscany and the major role played by the International Gothic style. Part II: analysis of each area of the Italian peninsula, taking into account its history and political structure and showing how Italy's political fragmentation gave birth to different kinds of Renaissance. DR:7(2)

4 units (Nova) not given 1994-95

112C/212C. The Age of Rubens and Rembrandt — Major artistic developments in the Low Countries during the 17th century focused on the great person-tries and important episodes during this period. The artist's position in his society served as the point of departure. DR:7(2)

4 units (Miller) not given 1994-95

116A/216A. Art and Architecture in the Age of the Baroque — A study of some of the key events throughout Western Europe. DR:7(2)

4 units (Miller) not given 1994-95

116B/216B. The Carracci and their Tradition in Bolognese Painting through the 17th-18th Centuries — The nature of the crucial reform style evolved by the Carracci in Bologna and Rome and its consequences for European painting; the art of Domenichino, Reni, Albani, Guercino, and the continuing authority of the Carracci tradition in Bologna into the 18th century.

4 units (Miller) not given 1994-95

120A/220A. 18th-Century Art in Europe, ca 1660-1780 — Survey of 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. DR:7(2)

4 units (Marrinan) not given 1994-95

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. DR:7(2)

4 units (Marrinan) not given 1994-95

120C/220C. The Age of Naturalism, ca 1830-1874 — Survey of 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. DR:7(2)

4 units (Marrinan) not given 1994-95


4 units (Elsen) not given 1994-95

120E/220E. Post-Naturalist Painting — Survey of 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 1870s. 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; Gauguin, 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.

4 units (Marrinan) not given 1994-95

121A/221A. 20th-Century European Painting, 1900-1920—Fauvism, Matisse, German and Austrian Expressionism, Picasso; and Cubism, Orphism, Futurism, and Abstraction.

4 units (Elsen) not given 1994-95


4 units (Elsen) not given 1994-95

123/223. Rodin — The art of Rodin and its relation to the time in which he lived. Lectures are supplemented by sessions in the Museum and Cantor Rodin Sculpture Garden.

4 units (Elsen) not given 1994-95

123A/223A. The Golden Age of Modern European Sculpture, 1900-1940—The art of Rodin, Matisse, Brancusi, Picasso, Lipchitz, Gabo, Arp, Giacometti, Gonzalez, Moore, and Calder.

4 units (Elsen) not given 1994-95

123B/223B. Modern Sculpture in America, 1945 to the Present — In addition to individual sculptors (Calder, Noguchi, Smith, Oldenberg, Segal, and Christo), focus is on groups such as the Minimalists and environmental artists, and the emergence of modern public sculpture in the U.S.

4 units (Elsen) not given 1994-95

124/224. Picasso — Lectures cover Picasso's work in all media.

4 units (Elsen) not given 1994-95

124B/224B. The Culture of High Modernism, 1897-1913 — The institutions of modernism from the advent of the impressionists in the first public collections of modernist art to Herwarth Walden's Herbstsalon. The rise and fall of artist societies, the triumph of the modern art market and the corresponding invention of modernist art historiography. The impact of colonialism, nationalism, feminism, and the new technologies of vision made on the aesthetics and on the cultural identities of modernist artists during the Belle Epoque.

4 units, Aut (Jensen)


4 units (Vinograd) not given 1994-95

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, Win (Vinograd)

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 1994-95

126C/226C. Artists and Systems in Later Chinese Painting — Survey of major Chinese artists from 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 1994-95

126D/226D. Landscapes, Geographies, and Ideologies: Inter-Cultural 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
126E/226E. Across Cultures: Encounters of Eastern and Western Art — Cross-cultural 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 1994-95

129/229. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868 — Integrated examination of selected aspects of the 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. DR: 2(*) or 7(2*)

4 units (Takeuchi) not given 1994-95

129A/229A. Painting in Late Medieval and Early Modern Japan, 1500-1868 — Investigation of the appearance, development, and interaction of the various courtly, military, and popular traditions of Japanese painting. Emphasis on questions of social meaning, patronage, and historical circumstance.

4 units (Takeuchi) not given 1994-95

130/230. Art in America and Britain, 1670-1825; Culture and Politics — Interdisciplinary study of major themes and genres of British and early American art. Focuses on art in relation to the French and Indian Wars, the American Revolution, and the invention of American national identity, and the art of indigenous peoples, particularly the Iroquois. Close readings of works of art. Artists: Copley, West, Trumbull, Allston, Hogarth, Wright of Derby. DR: 7(2)

4 units, Aut (Nemerov)

130A/230A. Art in America, 1825-1910: Culture and Politics — Interdisciplinary study of American art from the Romantic landscape, history, and genre painters to the nostalgic artists working circa 1900. Close readings of works of art. Artists: Cole and the Hudson River School, Mount and Bingham, Leutze, Homer and Eakins, Remington. DR: 7(2)

4 units, Win (Nemerov)

130B/230B. American Art between the Wars — Preference given to upper-class students with art history courses and some familiarity with the history of modernism. Early 20th-century American modernism, emphasizing nationalism, transatlantic exchange, and cultural politics. Topics and artists: the Armory Show, Gertrude Stein, Marcel Duchamp, Alfred Stieglitz, Charles Demuth, Georgia O’Keeffe, Paul Strand, the Regionalists, Walker Evans, the Harlem Renaissance, Paul Cadmus, and the Mexican muralists. Enrollment limited.

5 units (W. Corn) not given 1994-95

130C/230C. Culture in Crisis: American Art in the 1930s — The American artists’ response to the Great Depression, to the New Deal, and to European fashion. Emphasis is on the rise of the short-lived Regionalist movement, Depression era photography, New York modernism, government patronage of the arts, and the heated debates on culture and politics.

4 units (W. Corn) not given 1994-95

130D/230D. American Art since 1960 — Overview of recent American art beginning with the early career of Andy Warhol. Emphasis on the artists’ critique of the concepts of the great artist, artistic originality, the transcendence of art, and on various artists’ exposure and subversion of popular and high-brow constructions of race and gender.

4 units (Nemerov) not given 1994-95

130F/230F. Romantic Landscape Painting in America, 1825-1875 — Focuses on the art of Thomas Cole and the Hudson River School. Emphasis on American literature and British aesthetic theory, and on questions of patronage, industrialization, and tourism.

4 units (Nemerov) not given 1994-95

134/234. A History of Photography — Survey of the medium, from its pre-history in the Renaissance to the present. Discussions on the work of photographers who used available techniques to serve individual expression and the social and scientific uses of photography through its history. Required readings are thematically directed.

4 units (Leivick) not given 1994-95


4 units (Turner) not given 1994-95

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 (Turner) not given 1994-95

176/276. American Architecture and Urbanism — The development of architecture and city planning in the U.S. since colonial times, concentrating on those characteristics and problems which are distinctively American.

4 units, Win (Turner)
190X. Readings in Art History—For students with a knowledge of German (one year or equivalent) who want to acquire German reading proficiency in art.
3-4 units (Staff) not given 1994-95

ADVANCED UNDERGRADUATE AND GRADUATE

201. Seminar: Political Iconography—For graduate students. Study of certain 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 1994-95

202A. Undergraduate Colloquium: Greek Art—(Same as Classics 120A.)
4 units, Aut (Maxmin)

202B. Seminar: Greek Vase Painting—For graduate students only.
4 units (Maxmin) not given 1994-95

202C. Undergraduate Colloquium: Ancient Art
4 units (Maxmin) not given 1994-95

202D. Undergraduate Colloquium: Greek Art
4 units (Maxmin) not given 1994-95

206. Graduate Seminar: Medieval Art and Visual Theory—Readings, discussion, and critical analyses of medieval works of art and architecture, within the cognitive and perceptual frameworks of narratology, reception theory, and visual semiotics.
4 units (Lewis) not given 1994-95

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, Spr (Lewis)

206B. Undergraduate Seminar: The Gothic Cathedral—Readings, discussion, and term project centered on the Gothic cathedral in the context of medieval culture and society. Questions of spatial design, engineering, economics, political ideology, and social and religious functions. Concentrates on Chartres, Notre-Dame in Paris, Bourges, Canterbury, and the special cases of Saint-Denis and Westminster Abbey.
4 units (Lewis) not given 1994-95

214A. Seminar: Mannerism
4 units (Nova) not given 1994-95

214B. Colloquium: Iconology, Astrology, and the Warburg Institute from Aby Warburg to the Present—The past and recent history of the London-based humanities institute named after the German scholar, Aby Warburg. Students read/discuss books written by art and cultural historians associated with the institute: Saxl, Seznec, E. Panofsky, Yates, Gombrich, and Baxandall.
4 units (Nova) not given 1994-95

214C. Undergraduate Seminar: Michelangelo—Architect, sculptor, painter, draftsman, and poet, Michelangelo represents the Renaissance ideal of the universal man. In-depth study of his work and personality.
4 units (Nova) not given 1994-95

214D. Seminar: Italian Renaissance Drawings; Function, Form, and Collecting—Prerequisite: 110A, B, or C.
4 units (Nova) not given 1994-95

214G. Seminar: Monastic and Mendicant Patronage in Medieval and Early Modern Europe
4 units, Win (Nova)

217. Connoisseurship in 17th-Century Italian Drawing
4 units (Miller) not given 1994-95

218. Undergraduate Colloquium: Tides of Artistic Taste in 18th-Century Europe—Topics: the new style of “picturesque” gardening in England; historicism in revival styles; Gothic and Greek/Roman revivals; the architecture of Robert Adam; exoticism in taste, the Chinoiserie and Turkerie; the grand tour and art collecting; art and the theater.
4 units, Aut (Miller)

4 units (Miller) not given 1994-95

219A. Colloquium: The Bolognese School of Painting, 16th-18th Centuries
4 units (Miller) not given 1994-95

219B. Colloquium: The History of Printmaking
4 units (Miller) not given 1994-95

219C. Colloquium: Nicholas Poussin and the Problem of 17th-Century Classicism
4 units (Miller) not given 1994-95

221C. Seminar: Aspects of Realism in 19th-Century Painting
4 units (Marrinan) not given 1994-95

221D. Undergraduate Colloquium: Construction of the 19th-Century Masterpiece
4 units (Marrinan) not given 1994-95

221F. Undergraduate Seminar: Seurat
4 units (Marrinan) not given 1994-95

221H. Undergraduate Seminar: Paul Cezanne
4 units (Marrinan) not given 1994-95

222. Graduate Seminar: Cross-roads of the Enlightenment—The Artistic Culture of Rome in
the mid-18th Century — Rome, long a 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 prepare research topics and formal presentations on any relevant aspect of artistic life in Rome at this time, including: 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, Win (Marrinan)

223C. Seminar on Late 19th-Century Art: Rodin
4 units (Elsen) not given 1994-95

223D. Colloquium: Modern Sculpture in Europe and America
4 units (Elsen) not given 1994-95

223E. Colloquium: Perspectives on Modernism — Preference given to senior majors and graduate students. What constituted modernism from painters and sculptors, critics, and historians. Enrollment limited. Prerequisite: consent of instructor.

4 units (Elsen) not given 1994-95

223F. Seminar: The Origins of Modern Expression — The ideas and art that led to a historically new view of expression as seen in the art of early modernists (Matisse) when conversation and other forms of mutuality stopped in late 19th century painting.

4 units, Spr (Elsen)

224A. Seminar: Picasso — Prerequisites: 224, consent of instructor
4 units (Elsen) not given 1994-95

227/227A. Seminar: Painting and Theory in the Sung Dynasty — Problems in Five Dynasties and Sung period landscape, narrative, and figure painting studies. Emphasis on developments in art theory, criticism, ideologies, and social and institutional contexts for painting. 227A may be taken as a one-quarter reading course (227) or as a two-quarter reading and seminar sequence (227, 227A). 227A may not be taken alone.

4 units (Vinograd) not given 1994-95

227B. Seminar: Studies on 18th- and 19th-Century Chinese Painting — Investigation of newly important pictorial genres, antiquarian and popular taste, and the changing social role of urban painters in 18th- and 19th-century Yangchou and Shanghai.

4 units (Vinograd) not given 1994-95

227C. Seminar: Studies of 17th-Century Chinese Pictorial Art — Issues in 17th-century painting and printed illustrations, emphasizing the systems and contexts of image production. Centers of painting, including markets, courts and patrons; networks of support and signification for pictorial imagery; and the implication of pictorial arts in contestations of political and cultural authority.

4 units, Spr (Vinograd)

227D,E. Issues in Chinese Painting of the Late Ming Period — Problems of revival and revision of the past, the status of artists, and art historical theory in the late Ming period.

4 units (Vinograd) not given 1994-95

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, Aut (Vinograd)

227G. Seminar: Chinese Court Painting — Institutions and Ideologies — Topics: study of Chinese court painting during the Sung, Ming, and Qing periods. Court institutions of support, training, and patronage of artists; taste and aesthetic standards; ideological and political functions of painting.

4 units (Vinograd) not given 1994-95

229D. Seminar: Problems in Japanese Painting — Graduate seminar on selected aspects of Japanese painting; topic to be determined according to Asian art graduate student interests and needs. Possible topics: courtly tradition and its revivals, interplay of Chinese and Japanese painting, painter in Japanese society; and Japanese narrative or genre painting. Includes training in use of Japanese dictionaries, bibliographies, and other reference tools. Prerequisite: reading knowledge of Chinese or Japanese or consent of instructor.

4 units (Takeuchi) not given 1994-95

229E. Colloquium: Japanese Woodblock Prints — For undergraduates and graduate students. Technical, social, thematic, and connoisseurial aspects of "images of the floating world" in 18th- and 19th-century Japan. Prerequisites: 2, 12, 129 or 129A.

4 units (Takeuchi) not given 1994-95

229F. Colloquium: 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 1994-95

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 1994-95

229H. Seminar: Japanese Art
4 units, Aut (Takeuchi)

231A. Undergraduate Seminar: Photographs as Historical Documents
5 units (J. Corn, W. Corn) not given 1994-95


4 units, Win (W. Corn)

232A. Seminar: The Art of the Old West — Major painters and sculptors of the American West from 1880-1920, including Frederic Remington, Charles Russell, and Charles Schreyvogel. Cowboys and Indians in the context of evolutionary theory, ethnographic documentation, national symbolism, immigration and the urban world, the advent of movies, other turn-of-the-century nostalgias (e.g., New England and the Middle Ages), and questions about the recoverability of the past.

4 units (Nemerov) not given 1994-95

232B. Colloquium: Contemporary Cultural Criticism — Focuses on the ideological content of recent movies, television shows and commercials, art exhibitions, sporting events, and other contemporary products of American culture.

4 units (Nemerov) not given 1994-95

232C,D. Seminar: American Art as Culture — Theory and Practice — For graduate students and qualified undergraduates. Study of theoretical writings and historical interpretations bearing on our understanding of works of art as cultural artifacts. Students write a major research paper putting one or more of these theories into practice.

4 units (W. Corn) not given 1994-95

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. “New historical” emphasis on West in terms of the various discourses (British colonial expansion) embodied in his art. Close readings of individual works by West and his contemporaries.

4 units, Aut (Nemerov)

232F. Undergraduate Seminar: Interpretation and History — Hollywood Film, 1939-1955 — Focuses on film noir movies (Mildred Pierce and Double Indemnity) and on early technicolor films (King Vidor’s Northwest Passage). The problematics of relating a visual text (movie or otherwise) to a cultural moment.

4 units, Spr (Nemerov)

233. Colloquium on the History of Photography — Readings on the history and criticism of photography combined with a close study of works in Bay Area collections. Enrollment limited.

4 units (W. Corn) not given 1994-95

233C. Seminar: Post-WWII Transnational Art and Culture — Black and Jewish Diasporas in the U.S. — The problems and paradoxes of identity and difference in the context of Black and Jewish artistic production and writing in the U.S. after WWII. Emphasis is on the geographical spaces the transnational connotes on these traditions; how the retrieval of African traditions and religions by African-Americans is different from a retrospective devaluation of Jewish-American ethnic differences in exile; intercellular history of the Diaspora concept; shifting meaning of race and ethnicity and how it emerges through and against historical discourses of gender and sexuality in the arts; the relation between Jewishness modernism and Blackness in the writing of Jewish art critics (Walter Benjamin, Clement Greenberg and Meyer Schapiro); the contested meanings of Black-Jewish solidarity and the significance of the legacy of blackface; Black aesthetics and its relation to American art; the feminization of the Jewish male body in the internal ethnic differences among Jews as represented in their family albums; and the commodification of blackness through notions (the “primitive,” the “folk,” and the “tribal”). Exhibition, Faces of the Gods, curated by Robert Farris Thompson; symposium at the de Young Museum.

4 units, Aut (Bloom)

233D. Undergraduate Colloquium: Feminisms and Contemporary Art History — Focuses on feminine interventions in the history of art; the questions of sexuality in vision; shifts in feminist art practices from the 70s to the 90s; lesbian representations and queer theory; and images of “woman” by feminist artists and videomakers.

4 units, Win (Bloom)

235. Graduate Seminar on 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 1994-95

235A. Seminar on Art History: Ideas and Ideology — Readings/discussion of contemporary art his-
tory and art criticism, dealing with the problematics of post-structuralism, feminism and issues of gender, the new Marxism, reception theory, semiotics, and deconstruction.

4 units (Lewis) not given 1994-95

235B. Graduate Seminar: Notions of “the Public” in Art Historical Discourse
4 units (Marrinan) not given 1994-95

235C. Graduate Seminar: The Vision of Art History
4 units (Marrinan) not given 1994-95

235D. Graduate Seminar: Narrative Theory and Visual Forms
4 units (Marrinan) not given 1994-95

236. Art History Bibliography and Library Methods—Primarily for art history graduate students; upper-class undergraduate majors who plan to continue 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 art history and architectural history. Sources of artistic, historical, and cultural information in their printed and automated forms.

4 units (Ross) not given 1994-95

238A,B. Art and the Law—For graduate students in law, business, and art history. Selected problems at the intersection of law and the visual arts (painting, sculpture, and graphic art) including the protection of national art treasures and the international traffic in them; art forgery and its control; the artist’s “droit de suite” and “droit moral” and attempts to establish their equivalent in this country; legal relations between artists, dealers, museums, collectors, and auction houses; consumer protection and counterfeit art, etc.

2-3 units, Win, Spr (Elsen, Merryman)

239. Colloquium: The Western Artist From Antiquity to 1900—For art history majors and graduate students. Readings/discussion of important developments in the history of the artist’s profession.
4 units, Win (Elsen, Hansen, Pearson)

239A. Colloquium: The Western Artist in the 20th Century—For art history majors or graduate students. Readings/discussion. Topics: the artist as a political and social critic, censorship, artists’ rights, the art world, and self-imposed limits on artistic freedom.
4 units, Spr (Elsen)

240. Individual Work: Art History
any quarter (Staff) by arrangement

277. Seminar: Le Corbusier and Problems in Modern Architecture—Prerequisites: 175 or 176, consent of instructor.
4 units (Turner) not given 1994-95

278. Seminar: The Design of the American College Campus—Prerequisites: 175 or 176, consent of instructor.
4 units, Spr (Turner)

279. Seminar: Frank Lloyd Wright and Problems in American Architecture—Prerequisite: 175 or 176, consent of instructor.
4 units, Aut (Joncas)

280. Seminar: Utopia and Reality in Modern Urban Planning—Primarily for Urban Studies majors but others may be admitted. Examines utopian urbanist thinkers (Ebenezer Howard, Le Corbusier, Frank Lloyd Wright, and others) who have established the conceptual groundwork of contemporary urban planning practice. Student participation and research-oriented term paper required.
4 units, Win (Stout, Turner) W 1:15-3:05

290. 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 (Vinograd)

295. Teaching and Professional Work Experience
4 units, Aut, Win Spr (Staff) by arrangement

300. Research Project: Art History
any quarter (Staff) by arrangement

312. Medieval Seminar—(Same as Humanities 312.) Graduate seminar on medieval literature, art, and contemporary theory.
3-4 units, Win (Lewis)

400. Dissertation: Art History
any quarter (Staff) by arrangement

RELATED TOPICS

Topography and Monuments of Greece—(See Classics 108.)

Classical Athletics—(See Classics 14.)

PRACTICE OF ART
FOR NON-MAJORS

These courses are designed for non-majors in studio art. No prerequisites.

14. Drawing for Non-Majors
2 units, Aut, Win (Staff)

16. Sculpture for Non-Majors
2 units, Spr (Staff)

17. Photography for Non-Majors
2 units, Spr (Staff)

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, Win, Spr (Kahn, Kedar, Weisman)

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 (Bigelow) not given 1994-95

70. Photography I — Critical, theoretical, and practical aspects of creative photography are addressed through basic camera and lab techniques. Class lecture and discussion, viewing of slides, and field work. Viewing sessions in the Stanford Museum and Art Gallery scheduled according to current exhibitions. 35mm camera required.
4 units, Aut, Win, Spr (Leivick, Volkerding)

INTERMEDIATE

When available, students are encouraged to take intermediate and advanced design courses for 4-6 units.

4 units (Katz) not given 1994-95

140. Drawing I — Recommended as the beginning drawing class for studio art majors. Fundamentals of composition in black and white. Emphasis 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. Prerequisite: 40 or 140, or consent of instructor.
3 units, Aut, Win, Spr (Staff)

142. Drawing III — Advanced drawing. Emphasis 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)

148. Monotype — Introduction to print-making using monotype, a graphic art medium which was used by such artists as Blake, Degas, Gauguin, Pendergast, and others. May be repeated for credit. Prerequisite: 40 or 140.
3 units (Staff)

148A. Introduction to Printmaking
3 units (Staff)

148B. Printmaking: Artists' Books
3 units (Staff)

149. Collage — Exploration of 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)

149A. Gouache — Intermediate/advanced painting on paper with this water-based medium. Observation and invention are explored. Prerequisites: 40 or 140, 145 or consent of instructor.
3 units (Hannah) not given 1994-95

153. Recent Sculpture Concepts and Projects — Study and practice of the art of recent decades emphasizing current post-abstract procedures. Various materials and non-materials. 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)
Spr (Kedar)
161. Visual Icons and Symbols — Introduction to the principles of type and symbol design, emphasizing conceptual thinking. Prerequisite: 60.

3 or more units, Aut (Kedar)

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, Aut (Kedar)

167. Metalsmithing — Projects in jewelry and small, fine objects. Emphasis on design and craftsmanship in metal construction and lost wax casting. Prerequisite: 160.

3 or more units (Kahn) not given 1994-95

168A. Introduction to Urban Design — (Same as Urban Studies 170.) 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 field workshops in San Francisco.

5 units, Win (Cast) Th 9-10:50 and 7-9 p.m. plus two Sat. workshops

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, Win (Kahn)

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 (Volkerding)

172. Alternative Processes — Priority is given to advanced students. Concerned primarily with technical procedures and the uses of primitive and handmade photographic emulsions. Enrollment limited to 10. Prerequisites: 70, 170, 270, or consent of instructor.

3 units, Aut (Leivick)

173. Photography Abroad — Students may register for 1 or more units for work done out of residence or in an overseas program. Lab work is done on return to Stanford campus. Prior consent of instructor required.

1 or more units, Aut, Win, Spr (Leivick, Volkerding)

173A. Photography: Pinhole to Pixel — Students construct their own cameras from ordinary light-tight objects (show 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, Aut (Volkerding)

ADVANCED UNDERGRADUATE AND GRADUATE

When available, students are encouraged to take intermediate and advanced design courses for 4-6 units.

241. Advanced Drawing and Painting Criticism I — Prerequisites: at least two quarters of painting or drawing and consent of instructor.

Aut, Win, Spr (Staff) by arrangement

242. Advanced Drawing and Painting Criticism II — Prerequisites: at least two quarters of painting or drawing and consent of instructor.

Aut, Win, Spr (Hannah) by arrangement

243. Advanced Drawing and Painting Criticism III — Prerequisites: at least two quarters of painting or drawing and consent of instructor

Aut, Win, Spr (Staff) by arrangement

244. Advanced Drawing and Painting Criticism IV — Prerequisites: at least two quarters of painting or drawing and consent of instructor.

Aut, Win, Spr (Branch) by arrangement

246. Individual Work: Drawing and Painting — Prerequisites: at least two quarters of painting or drawing and consent of instructor.

Aut, Win, Spr (Staff) by arrangement

248. Advanced Monotype — Continuation of monotype, dealing with advanced technical and aesthetic problems in the medium. Prerequisite: 148.

3 or more units (Staff)

250. Individual Work: Sculpture any quarter (Randell) by arrangement

260. Individual Work: Design any quarter (Kahn) by arrangement

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, Win (Kedar)

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, Spr (Kedar)

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 (Kahn)
269. Advanced Creative Studies — Evening 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, Volkerding) by arrangement

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 (Volkerding)

Win, Spr (Leivick)

272. Individual Work: Photography — Student continues with own work, showing it in weekly seminar critiques.

any quarter (Leivick, Volkerding) by arrangement

273. Photography and the Human Face — Through slide lectures and practical work, attempts to determine when a picture of a person becomes a portrait, and in turn, when the portrait becomes a work of art. Various format cameras are available to students in addition to their personal camera. Prerequisite: 70.

3 units (Volkerding) not given 1994-95

273B. Photography and Landscape — Changing attitudes toward nature and the environment are studied through slide lectures, museum study sessions, and field work in photography. Students work according to their own level of technical proficiency. Medium format and view cameras are available for use by advanced students. Prerequisite: 70.

3 units, Aut (Volkerding) not given 1994-95

281. Concepts of Text for Human-Computer Interfaces — (Same as Computer Science 273.) 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; seminology and semiotics of writing systems.

3 units, Spr (Bigelow)

342. Master's Project

any quarter (Staff) by arrangement

360A, B, C. Master's Project (Seminar): Design

Aut, Win, Spr (Kahn) by arrangement

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.

110Y. Italian Painting and Sculpture as Historical Documents — Florence. DR:7(2)

4 units, Win (Borsook)

110Z. Florentine Painting and Sculpture from 1260 to 1530 — Florence. DR:7(2)

4 units, Aut (Borsook)

120X. New Ways of Seeing — Berlin. DR:7(2)

4 units, Win (Neckenig)

120Z. French Painting from 1780-1900 — Paris. DR:7(2)

4 units, Win (Halevi)

174Y. Architecture and the City, 1871-1990: Berlin as Nucleus of Modernity — Berlin. DR:7(2)

4 units, Aut, Win (Neckenig)

221Y. Art and Society in Britain, 1870-1939 — Same as History 243V.) Oxford.

5 units, Spr (Tyack)

ASIAN AMERICAN STUDIES

Affiliated Faculty: Rudy Busto (Religious Studies), Gordon Chang (History), Bill Ong Hing (Law), Karen Huang (Student Health Services), David Palumbo-Liu (Comparative Literature, East Asian Studies, and Modern Thought and Literature), Sylvia Yanagisako (Anthropology, Feminist Studies, Modern Thought and Literature)

Postdoctoral Fellow: Susan Chow (Sociology)

Asian American Studies at Stanford is taught through offerings in a number of departments — Anthropology, Comparative Literature, History, and Law; other departments may offer courses that are relevant to Asian American Studies.

Currently, there are two introductory courses that may be taken either separately or in tandem and various advanced courses. While a degree program in Asian American Studies is not offered, students are strongly encouraged to contact affiliated faculty to share interests and explore the various possibilities for programs of research and study.
COURSES

Note—As of press time, course offerings in Asian American Studies are still being added. Please contact faculty or departments at the beginning of the academic year for full listings.

HISTORY

159. Introduction to Asian American History—DR:3 (Chang)

265S. Undergraduate Research Seminar: Asian-American History (Chang)

SOCIOMETRY

147S. Women of Color: The Interaction of Race, Ethnicity, Class, and Gender (Chow)

151S. Assimilation or Ethnic Persistence: Asians in America (Chow)

ASIAN LANGUAGES

Emeriti: (Professors) Albert E. Dien, David S. Nivison, Frederic Spiegelberg
Chair: Thomas W. Hare
Professors: Makoto Ueda (on leave Autumn, Spring), John C. Y. Wang (on leave Winter, Spring)
Associate Professors: Thomas W. Hare (Asian Languages and Comparative Literature), William A. Lyell (on leave Autumn), Susan K. Matsisoff
Assistant Professors: Wan Liu, Yoshiko Matsumoto, Chao Fen Sun
Senior Lecturers: Kazuko M. Busbin, Yin Chuang, Kimie Nishimura Nebrig, Hiroshi Sakamoto, Dorothy Shou
Visiting Professor: Yixin Chen
Visiting Assistant Professor: Charles Egan (Mellon Fellow)
Acting Assistant Professor: Donna Storey
Chinese-Japanese Language and Area Studies Faculty:
Professors: Masahiko Aoki (Economics), Harumi Befu (Anthropology), Peter Duus (History, on leave 1994-95), Harold L. Kahn (History), Lawrence Lau (Economics), John W. Lewis (Political Science), Jeffrey Mass (History), Daniel I. Okimoto (Political Science), Thomas P. Rohlen (School of Education), Makoto Ueda (Asian Languages), John C. Y. Wang (Asian Languages), Arthur P. Wolf (Anthropology), Lee H. Yearley (Religious Studies)
Associate Professors: Carl W. Bielefeldt (Religious Studies), Bernard Faure (Religious Studies), Thomas W. Hare (Asian Languages and Comparative Literature), William A. Lyell (Asian Languages), Susan K. Matsisoff (Asian Languages), William Poser (Linguistics), Melinda Takeuchi (Art), Richard Vinograd (Art)
Assistant Professors: Philip J. Ivanhoe (Philosophy and Religious Studies), James E. Ketelaar (History), Wan Liu (Asian Languages), Yoshiko Matsumoto (Asian Languages), Ellen Neskar (History), David Palumbo-Liu (Comparative Literature), Yingyi Qian (Economics), Peter Sells (Linguistics), Chao Fen Sun (Asian Languages)
Senior Lecturers (Asian Languages): Kazuko M. Busbin, Yin Chuang, Kimie Nishimura Nebrig, Hiroshi Sakamoto, Dorothy Shou
Visiting Professor: Shou-hsin Teng (Taipei Center)

The Department of Asian Languages offers courses in the languages, 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, Department of Linguistics.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The A.B. degree is granted both in Chinese and in Japanese. The following courses must be completed with a letter grade indicator (LGI) of 'C' or better:

1. Concentrations in Chinese: Asian Languages 91, 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.
2. Concentrations in Japanese: Asian Languages
92, Japanese 103, and seven other content
courses dealing primarily with Japan at the 100
level, as approved by the undergraduate ad-
viser. At least two of these courses must be
selected from the sequence 135, 136, 137, 138.
These requirements are in addition to the
University’s basic requirement for the bachelor’s
degree. Letter grades are mandatory for all re-
quired courses.

HONORS PROGRAM
Majors with an overall LGI 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 will 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 fin-
ished thesis.

COTERMINAL PROGRAMS
Students may elect to combine programs for
the A.B. and A.M. degrees in Chinese or Japa-
nese. For details, see the “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 vari-
ety of opportunities to expand their knowledge,
understanding, and appreciation of East Asia.
Assignment is made through the regular under-
graduate housing draw.

SUMMER PROGRAM OF
INTENSIVE LANGUAGE
COURSES
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. (See courses
Chinese 5, 25, 105 and Japanese 5, 25, 105, and
114 as described below.) For detailed informa-
tion about these and other aspects of the summer
program, apply directly to the Department of Asian
Languages.

GRADUATE PROGRAMS
ADMISSION
All students contemplating application for
admission to graduate study must have a credi-
table undergraduate record at Stanford or else-
where. 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 in-
tends 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 his-
tory (pre-modern), Chinese linguistics, Chinese
literature, Chinese philosophy, Japanese cultural
history, Japanese literature, and Japanese linguis-
tics.

MASTER OF ARTS
The A.M. is granted in Chinese and in Japa-
nese. 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 cen-
ters 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 “Advanced 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 up-
per-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 stu-
dent'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.

**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.

**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 "Advanced 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, Chinese history, Chinese philosophy, Chinese linguistics, Chinese religion, Chinese art, Chinese anthropology, Japanese literature, Japanese linguistics, Japanese history, Japanese religion, Japanese art, and Japanese anthropology.
5. Demonstrate pedagogical proficiency by serving as a teaching assistant for a minimum of one quarter.

**University Oral Examination** — General regulations governing the oral examination are found in the "Advanced 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 departmental adviser. The student must elect either Chinese 201 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.

SPECIAL PROGRAMS

Properly qualified students may plan special interdepartmental programs in the Asian field for the Ph.D. degree. See the "Graduate Special Programs" section of this bulletin.

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 eight other American universities. In addition, 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 information about either program, students should contact the Overseas Studies office in Sweet Hall. To fulfill the language requirement for the SCTI program at Kyoto, students must complete five quarters of Japanese for Professionals (7, 8, 9, 17, 18) or Japanese 1 and 2.

Attention is called to the programs of the Inter-University Program for Chinese Language Studies in Taipei and the Inter-University Center for Japanese Studies located in Yokohama (both of which are administered by Stanford University). See "The Institute for International Studies" section of this bulletin.

Special attention is 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

Since unavoidable changes occasionally have to be made in course offerings after this bulletin has gone to print, students are advised to consult the department each quarter.

GENERAL

These courses are open to all undergraduates and graduate students, are taught in English, and do not require a knowledge of an Asian language.

46. Introduction to Chinese Thought — (Same as Philosophy 46, 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. DR:2(*) or 8(3*)
4 units, Spr (Ivanhoe)

3 units, Win, Sum (Dasher)

91. Traditional East Asian Civilization: China — Introduction to Chinese culture in a historical context. DR:2(*) or 7(2*)
5 units, Aut (Egan) TTh 9:30-11

92. Traditional East Asian Civilization: Japan — (Same as History 196). 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. DR:2(*) or 7(2*)
5 units, Win (Hare) MWThF 2:15

95. The Japanese Language in Culture and Society — Introduction to the essentials of how the language functions in Japanese society and culture; salient characteristics 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.
4 units, Spr (Matsumoto) MW 1:15-2:30

113. Zhuang Zi — (Same as Philosophy 113, Religious Studies 113.) 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 required. Separate readings for those who know Classical Chinese. Prerequisite: 46 or consent of instructor.
5 units (Ivanhoe) not given 1994-1995
131. Chinese Poetry in Translation — Readings in traditional poetry and poetics emphasizing genre, theme, and style. DR: 7(2*)
4 units, Aut (Liu) TTh 1:15-2:30

132. Chinese Fiction and Drama in Translation — Survey of fiction and drama from early times to the 19th century, emphasizing literary and thematic discussions of major representative works available in English translation. DR: 2(*) or 7(2*)
4 units, Win (Staff) MWF 11

133. Modern Chinese Literature in Translation — Readings in representative 20th-century works of fiction, drama, and poetry. DR: 2(*) or 7(2*)
4 units, Spr (Lyell)

134. Contemporary Chinese Fiction — Readings in post-1976 short stories and novels. DR: 2(*) or 7(2*)
4 units (Lyell) not given 1994-95

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. DR: 7(2*)
4 units, Aut (Matisoff) TTh 2:15-3:30

4 units (Staff) not given 1994-95

137. Japanese Fiction in Translation — Introduction to major works of prose narrative from pre-modern Japan (7th through mid-19th centuries), read in English translation, emphasizing the historical, intellectual, and cultural context in which they were written. Works vary each year; course may be repeated for credit with instructor’s consent. DR: 7(2*)
4 units (Matisoff) not given 1994-95

138. Modern Japanese Literature in Translation — Introduction to Japanese poetry, drama, and fiction since 1868. Authors: Tanizaki, Kawabata, Mishima, etc. DR: 2(*) or 7(2*)
4 units, Spr (Staff) MWF 11

142. Constructing the Subject — Overlooked elements of grammar and linguistic structure (e.g., person, number, gender, tense) carry significant weight in the construction of literary subjectivity. Focus is on the role played by these elements in the subject as constructed in classic texts from India, Japan, and Ancient Egypt. DR: 7(2) or 8(3)
4 units (Hare) not given 1994-95

156. Chinese History fromEarliest Times to the 9th Century — (Same as History 192A.) Geo-historical origins to the Tang period: the first 4,000 years of social formations and historical transformations of ancient and early medieval China. DR: 2(*)
5 units, Win (Neskar) MWTWhF 11

181. Japanese Women Writers — Survey of 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. DR: 7(2*)
4 units (Matisoff) not given 1994-95

182. Chinese Lyric Aesthetics — Traditional concepts of poetry, music, painting, and their interrelationships.
4 units, Win (Liu) TTh 2:15-3:30

192S. Undergraduate Seminar: China in the Western Imagination, 16th-20th Century — (Same as History 292S.) 500 years of reinvention of China in the Western mind. Through the use of Jesuit correspondence, diplomatic reminiscence, missionary memoirs, modern journalism, traveler’s 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, Spr (Kahn) W 1:15-3:05

3 units (Ueda) not given 1994-95

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. Please 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 (Shou) MWTWhF 10, 11, or 1:15
2.5 units, Win (Shou) MWTWhF 10, 11, or 1:15
3.5 units, Spr (Shou) MWTWhF 10, 11, or 1:15

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.
1. 3 units, Aut (Rozelle) MWF 10, 1:15, or 2:15
1B. 3 units, Win (Rozelle) MWF 10, 1:15, or 2:15
3B. 3 units, Spr (Rozelle) MWF 10, 1:15, or 2:15
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) MTWThF 8-12

7.8. Beginning Conversational Chinese — Two-quarter sequence to equip students with basic language skills in Mandarin to function abroad.
7. 2 units, Win (Staff) TTh 2:15
8. 2 units, Spr (Staff) TTh 2:15

10.11. Beginning Southern Min (Taiwanese) Conversation
2 units, Aut, Win (Huang) TTh 12:10-1

14.15. Advanced Southern Min (Taiwanese) Conversation
2 units, Aut, Win (Rozelle) by arrangement

21,22,23. Second-Year Modern Chinese — Further study in grammar, reading, conversation, composition. Prerequisite: 3 or equivalent.
21. 5 units, Aut (Y. Wang) MTWThF 9 or 10
22. 5 units, Win (Y. Wang) MTWThF 9 or 10
23. 5 units, Spr (Y. Wang) MTWThF 9 or 10

25. Intensive Second-Year Modern Chinese — Equivalent to 21, 22, 23 combined. Prerequisite: 3 or equivalent. Five weeks at Stanford and four weeks at Peking University.
8 units, Sum (Staff) MTWThF 8-12

27,28,29. Intermediate Chinese Conversation — Prerequisite: 3 or consent of instructor.
27. 2 units, Aut (Shou) TTh 2:15
28. 2 units, Win (Shou) TTh 2:15
29. 2 units, Spr (Shou) TTh 2:15

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) TTh 2:15

ADVANCED

101,102,103. Third-Year Modern Chinese — Introduction (using annotated texts) to newspapers, documents, motion pictures, and advanced modern Chinese essays and articles. Prerequisite: 23 or equivalent.
101. 5 units, Aut (Thai) MTWThF 11
102. 5 units, Win (Thai) MTWThF 11
103. 5 units, Spr (Thai) MTWThF 11

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) MTWThF 9-12

121,122,123. Advanced Chinese Conversation — Prerequisite: 23 or equivalent.
121. 2 units, Aut (Chuang) W 2:15-4:05
122. 2 units, Win (Chuang) W 2:15-4:05
123. 2 units, Spr (Chuang) W 2:15-4:05

131,132,133. Business and Legal Chinese — Year-long sequence for those interested in China's foreign trade. A familiarization with the technical language and current economic policies. Emphasis on close text reading, business letter writing, and conversation. Prerequisite: 23 or equivalent.

199. Individual Reading in Chinese — Asian Languages majors only. Prerequisite: 103 or consent of instructor.
4 units, Aut, Win, Spr (Staff) by arrangement

GRADUATE

200. Directed Reading in Chinese — Prerequisite: 213 or 223, or consent of instructor.
units by arrangement, Aut, Win, Spr (Staff) by arrangement

201. Proseminar — Research methods in Chinese studies. Prerequisite: 223 or equivalent.
5 units, Aut (Chen) W 2:15-4:05

205,206,207. 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 the commonly used vocabulary of Classical Chinese. Prerequisite: 23 or equivalent.
205. 5 units, Aut (Sun) TTh 2:15-4:05
206. 5 units, Win (Sun) TTh 2:15-4:05
207. 5 units, Spr (Staff) TTh 2:15-4:05

208. Teaching Asian Languages — (Same as Linguistics 188.) 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 (Staff) by arrangement

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) by arrangement
212. 5 units, Win (Chuang) by arrangement
213. 5 units, Spr (Chuang) by arrangement

221,222,223. Advanced Classical Chinese — Prerequisite: 207 or equivalent.

221. Philosophical Texts
5 units, Aut (Ivanhoe) MWF 1:15

222. Historical Narration
5 units, Win (Staff) TTh 11-12:15

223. Literary Essays
5 units, Spr (Liu) TTh 2:15

230. Interpreting Confucian Texts — (Same as Philosophy 211, Religious Studies 212.) Illustrates 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, Spr (Ivanhoe) MW 2:15-4:05

231. Neo-Confucianism — (Same as Philosophy 114, Religious Studies 119A.) Introduction to later Confucian thought as represented in the Song through Qing dynasties. Brief introduction to Buddhist concepts which provided some of the theoretical foundations for the 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: consent of instructor.

4 units (Ivanhoe) not given 1994-95

232. Philosophical Texts of the Ming Dynasty — (Same as Philosophy 212, Religious Studies 212.) Focuses on syntax and range determined by constituents. Prerequisite: consent of instructor.

5 units (Ivanhoe) not given 1994-95

241,242,243. Modern Chinese Literature — The short story, essay, and novel introduced through original and annotated texts.

241. The Short Story
5 units, Win (Lyell) MWF 10

242. Essay
5 units, Spr (Chuang) MWF 10

243. The Novel
5 units (Lyell) not given 1994-95

261. Shih-ching and Ch’u-tz’u — Selected readings in the two earliest anthologies of Chinese poetry. Prerequisite: consent of instructor.

4 units, not given 1994-95

262. Readings in Yueh-fu Poetry — The Yueh-fu (music-bureau poetry) genre was a Chinese poetic tradition; yet the variety of Yueh-fu makes definition difficult. The development of Yueh-fu through its manifestations. Topics: Han folk and ritual poetry, the rise of “scholar Yueh-fu”, Six Dynasties love poetry, and T’ang reinterpretations. Prerequisite: consent of the instructor.

4 units, Spr (Egan) TTh 9:30-10:45

263. Lyric (Shih) I — Selected readings in the early history of the lyric (shih), Han through Sui dynasties.

4 units (Liu) not given 1994-95

264. Lyric (Shih) II — T’ang poetry, focusing on Li Po and Tu Fu and their places in the Chinese poetic tradition. Prerequisite: consent of instructor.

4 units, Aut (Liu) MW 2:15-3:30

266. Songs and San-ch’ü — Selected readings of songs (tzu) and San-ch’ü, Tang through Ming. Prerequisite: consent of instructor.

4 units, not given 1994-95

271,272. Traditional Chinese Fiction — Selected readings in short stories and novels from early times to Ch’ing. Prerequisite: 207 or consent of instructor.

271. 4 units (J. Wang) not given 1994-95
272. 4 units (J. Wang) not given 1994-95

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 (J. Wang) not given 1994-95

291. The Structure of Modern Chinese — (Same as Linguistics 291.) Introduction to the grammatical structure of Chinese, focusing on syntax and semantics. Prerequisite: 3 or equivalent, or consent of instructor.

4 units, Spr (Sun) TTh 1:15

292. The History of Chinese — Historical changes of the Chinese language in the last 2,000 years with emphasis on syntax. Prerequisites: 207, 291, or consent of instructor.

4 units (Sun) not given 1994-95

299. Master’s Thesis or Translation — A total of 5 units taken in one or more quarters.

Aut, Win, Spr (Staff) by arrangement

334. Seminar in Modern Chinese Literature — May be repeated for credit. Prerequisite: 243 or consent of instructor.

5 units, Spr (Lyu) MW 2:15-3:30

361. Seminar on T’zu Poetry of the Tang and Song

5 units, not given 1994-95

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. Prerequisite: 233 or consent of instructor.

5 units (J. Wang) not given 1994-95


1-12 units, Aut, Win, Spr, Sum (Staff) by arrangement

400. Advanced Language Training — Open only to students in the Taipei program. For more information, see the “Inter-University Program for Chinese Language Studies in Taipei” section of this bulletin.

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 — Basic conversation, grammar, reading, elementary composition.

1. 5 units, Aut (Sakamoto, Staff)
   MTWThF 9, 10, 11, or 1:15
2. 5 units, Win (Sakamoto, Staff)
   MTWThF 9, 10, 11, or 1:15
3. 5 units, Spr (Sakamoto, Staff)
   MTWThF 9, 10, 11, or 1:15

5. Intensive First-Year Modern Japanese — Equivalent to 1, 2, and 3 combined.

12 units, Sum (Staff) MTWThF 8-12

21,22,23. Second-Year Modern Japanese — Continuation of Japanese 3 (or 5); develop conversation, expression of ideas, master more advanced grammar and patterns, use 600 kanji, write simple composition, enhance understanding of Japanese culture. At completion of sequence, student can read original source material. Prerequisite: 3 or equivalent.

21. 5 units, Aut (Nebrig, Staff)
    MTWThF 9, 11, or 1:15
22. 5 units, Win (Nebrig, Staff)
    MTWThF 9, 11, or 1:15
23. 5 units, Spr (Nebrig, Staff)
    MTWThF 9, 11, or 1:15

25. Intensive Second-Year Modern Japanese — Equivalent to 21, 22, and 23 combined. Prerequisite: 3 or equivalent.

12 units, Sum (Staff) MTWThF 8-12


27. 2 units, Aut (Kubo) TTh 2:15
28. 2 units, Win (Kubo) TTh 2:15
29. 2 units, Spr (Kubo) TTh 2:15

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) MWF 11-12:20
     or 12:45-2:05
102. 5 units, Win (Arao) MWF 11-12:20
103. 5 units, Spr (Arao) MWF 11-12:20

104. Japanese for Chinese Specialists — Focus is on the use of research materials in Japanese. Prerequisite: 102 or equivalent.

5 units, Spr (Staff) by arrangement

105. Intensive Third-Year Modern Japanese — Equivalent to 101, 102, and 103 combined. Prerequisite: 23 or equivalent.

12 units, Sum (Staff) MTWThF 9-12
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. May be repeated for credit. Prerequisite: 23 or 25 or consent of instructor.

111. 3 units, Aut (Yagi) MW 12:45-2:05
112. 3 units, Win (Yagi) MW 12:45-2:05
113. 3 units, Spr (Yagi) MW 12:45-2:05

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) TTh 4-6

121, 122, 123. Advanced Japanese Conversation — Enlarges vocabulary, focusing on improvement in fluency and listening comprehension. Fine tuning of grammatical points and practice explaining things in Japanese. Use of audiotapes, oral presentations, discussions. Prerequisite: 23, 29, or consent of instructor.

121. 2 units, Aut (Kubo) TTh 1:15
122. 2 units, Win (Kubo) TTh 1:15
123. 2 units, Spr (Kubo) TTh 1:15

130. Reading Technical Japanese — Prerequisite: two years of Japanese or equivalent.

3 units, Sum (Dashner)

177. The Structure of Japanese — Overview of the grammatical structure of Japanese, focusing on its salient characteristics and functions. Prerequisite: one year of Japanese. Recommended: previous course in linguistics.

4 units (Matsumoto) not given 1994-95

199. Individual Reading in Japanese — Asian Languages majors only. Prerequisite: 103 or consent of instructor.

4 units, Aut, Win, Spr (Staff) by arrangement

GRADUATE

200. Directed Reading in Japanese — Prerequisite: 213 or consent of instructor.

units by arrangement, Aut, Win, Spr (Staff) by arrangement

201. Proseminar — Bibliography and research methods in Japanese studies. Prerequisite: 103 or equivalent.

3 units (Matisoff) not given 1994-95

208. Teaching Asian Languages — (Same Linguistics 188.) Lectures on teaching methods, class visits, 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 (Staff) by arrangement

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 consent of instructor.

211. 5 units, Aut (Matsumoto) MW 11-12:15
212. 5 units, Win (Matsumoto) MW 11-12:15
213. 5 units, Spr (Kubo) MW 11-12:15

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 (Hare) by arrangement

247, 248. Readings in Classical Japanese — Readings of texts in classical Japanese from Nara through Tokugawa periods. Literary analysis, rhetoric, and poetics (Japanese and Western). Offered alternate years and can be taken independently. Prerequisite: 246.

247. 5 units (Matisoff) not given 1994-95
248. 5 units, Win (Hare) by arrangement

250. Introduction to Kambun — Readings from Japanese works written in Kambun, from Kaifuso to Yoshida Shoin’s diary. Offered when there is sufficient demand. Prerequisite: basic knowledge of classical Japanese.

4-5 units, Win (Mass) by arrangement


4 units (Staff) not given 1994-95


5 units, Spr (Bielefeldt) by arrangement

275. Canons and Conventions in Traditional Japanese Literature — Canon formation and the development of conventions of interpretation in Heian, Kamakura, and Muromachi literary forms, specifically waka from the Imperial Anthologies, renga, and noh drama. Prerequisite: 247 or 248.

4 units (Hare) not given 1994-95
277. The Structure of Japanese — Overview of the grammatical structure of Modern Japanese, focusing on its salient characteristics and functions. Prerequisite: one year of Japanese. Recommended: previous course in linguistics.
4 units (Matsumoto) not given 1994-95

280. Medieval Japanese Narrative and Dramatic Literature — Reading/discussion of selected works of the Muromachi through early Edo periods. Prerequisite: 247, 248, or equivalent.
4 units, Spr (Matisoff) TTh 2:15-3:30

281. Japanese Pragmatics — (Same as Linguistics 281.) 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, Aut (Matsumoto) MW 2:15-3:30

4 units (Matsumoto) not given 1994-95

294. Major Haiku Poets — Reading/discussion of selected haiku by Basho, Buson, Issa, and others. Prerequisite: 103 or equivalent.
4 units (Ueda) not given 1994-95

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, Aut (Storey) MW 11-12:15

297. Images of Women in Modern Japanese Literature — Reading/discussion of selected literary works illuminating various aspects of the female experience in modern Japan. Prerequisite: 213 or equivalent.
4 units (Ueda) not given 1994-95

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, Win (Ueda) MW 2:15-3:30

299. Master's Thesis or Translation — A total of 5 units, taken in one or more quarters.
Aut, Win, Spr (Staff) by arrangement

300. 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 1994-95

333. Seminar in Japanese Classical Drama — Advanced work in traditional dramatic forms, focusing on Noh drama and emphasizing the relationship between Zeami’s dramatic theory and selected plays of the modern repertory. Also, issues of performance, contemporary and historical. Students complete a major paper. Prerequisite: 246. 5 units (Hare) not given 1994-95

396. Seminar in Modern Japanese Literature — May be repeated for credit. 5 units (Ueda) not given 1994-95

1-12 units, Aut, Win, Spr, Sum (Staff) by arrangement

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 of this bulletin. 15 units per quarter (Staff)

KOREAN

1,2,3. First-Year Modern Korean — Conversation, grammar, reading, elementary composition. Daily sections may be set at the beginning of the quarter to suit the schedule requirements.
5 units, Aut, Win, Spr (Cho) MTWThF 1:15

21,22,23. Second-Year Modern Korean — Further instruction and practice in conversation, grammar, reading, and composition. Daily sections may be set at the beginning of the quarter to suit schedule requirements.
5 units, Aut, Win, Spr (Cho) by arrangement

101,102,103. Third-Year Modern Korean — Readings in modern Korean scholarly, journalistic, and literary prose. Prerequisite: 23 or equivalent.
3 units, Aut, Win, Spr (Cho) by arrangement

200. Directed Reading in Korean — Prerequisite: 103 or consent of instructor.
units by arrangement, Aut, Win, Spr (Cho) by arrangement

208. Teaching Asian Languages
2 units, Win (Cho) by arrangement

271. The Structure of Korean — (Same as Linguistics 271.) Survey of grammatical structure of Korean, emphasizing interactions of phonology, morphology, and syntax. Topics: interaction of morphology with phonology within the lexicon, morphosyntax, and phrasal phonology.
4 units, Win (Cho) by arrangement
 Emeriti: (Professors) Ronald N. Bracewell, Von R. Eshleman, John R. Spreiter
Committee in Charge: Vahe Petrosian (Chair): Roger W. Romani, Peter A. Sturrock, Robert V. Wagoner, Arthur B. C. Walker, Jr.
Associate Professor: Peter F. Michelson (Physics)
Assistant Professor: Roger W. Romani
Professors (Research): Philip H. Scherrer, J. Gethyn Timothy

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 Spectroscopic Survey telescope, a 10-meter-class telescope to be located at McDonald Observatory in Texas. Construction of the telescope is underway. There will be opportunities for graduate students doing research projects to use this telescope starting in late 1996.

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; 365, Extragalactic Astrophysics and Cosmology; 364, Gravitation; 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 courses.
15A. The Nature of the Universe — For undergraduates (with or without scientific background). 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.

DR:5(7)
3 units, Win (Walker) MW 2:15-3:30

15B. Cosmic Horizons — (Enroll in Physics 15B.)
3 units, Spr (Petrosian) MW 1:15-2:30

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) by arrangement

169B. Continuation of Project — Substantial completion of the required computations or data analysis for the research project selected.
1-9 units, Win (Staff) by arrangement

169C. Completion of the Project — Completion of research and writing of a detailed paper presenting methods used and results.
1-9 units, Spr (Staff) by arrangement

AFFILIATED DEPARTMENT OFFERINGS

APPLIED PHYSICS

312. Basic Plasma Physics
3 units, Win (Sturrock)
alternate years, not given 1995-96

363. Solar and Solar-Terrestrial Physics
3 units (Sturrock)
alternate years, given 1995-96

ELECTRICAL ENGINEERING

106. Planetary Exploration
3 units, Spr (Eshleman) MWF 9

GEOPHYSICS

195. Terrestrial Planets
3 units, Spr (Sleep)
alternate years, not given 1995-96

PHYSICS

27. Evolution of the Cosmos
3 units, Aut (Wagoner) TTh 11-12:15
discussion by arrangement

50. Astronomy Laboratory and Observational Astronomy
3 units, Aut, Sum (Walker) lecture M 4:15
lab by arrangement

100. Introduction to Observational and Laboratory Astronomy
4 units, Spr (Walker) M 3:15-5
lab by arrangement

160. Introduction to Stellar and Galactic Astrophysics
3 units, Aut (Romani)

161. Introduction to Extragalactic Astrophysics and Cosmology
3 units, Win (Petrosian)

262. Introduction to Gravitation and Astrophysics
3 units, Win (Wagoner) TTh 9:30-10:50

301. Astrophysics Laboratory
3 units, Sum (Walker)

360. Stellar Physics
3 units (Petrosian)
alternate years, given 1995-96

362. High Energy Astrophysics
3 units, Spr (Petrosian) TTh 2:15-3:30
alternate years, not given 1995-96

364. Advanced Gravitation
3 units (Wagoner) not given 1994-95

365. Extragalactic Astrophysics and Cosmology
3 units, alternate years, not given 1995-96

460. Astrophysics Seminar
1 unit, Aut, Win, Spr (Petrosian)

463. Special Topics in Astrophysics

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. Ruetz; (Associate Director) Robert C. Young

Director: Ted Leland
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 is expected to provide 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 dance and sport, to develop the habit of participation, and to provide leadership opportunities in aquatics, dance, 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, including, intercollegiate athletic competition and dance performance.

PROGRAMS
ACADEMIC DEGREES

No degrees are offered in Physical Education. The Master of Arts degree in Education: Dance Specialization is offered through the School of Education either as a coterminal degree or as a post-bachelor's degree program. Undergraduate students interested in the coterminal master's degree should consult with Dance Degree Adviser, Janice Ross.

DANCE DIVISION

Dance in the University plays a vital role in the college experience of self-definition and provides the means to experience the body in new ways through diverse forms of movement. Students come to understand dance as a conduit for impression and expression in society. It becomes a means of giving physical voice to the most private and powerful aspects of an individual's understanding of the person in relation to the world.

Dance in the University has the capacity and the ethical mandate to awaken and stimulate each individual. The goal is to develop a trained body, a cultivated mind, and passionate engagement through movement experience. 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, cultures, and historical periods.

As society increasingly rediscovers the arts as a way of knowing, dance is a means through which students grow in their ability to comprehend their world. Lifelong participation is a valuable part of a life lived with amplitude and discipline. Exposure to dance and the arts constitutes a vital form of cultural literacy, one that is indispensable to freedom of inquiry and expression.

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, contact Janice Ross.

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, and volleyball.

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 through the Director of Physical Education, Elizabeth Weeks. 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 residences. 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, dance, and sports for general recreation. Specific recreation hours for all the facilities are publicized throughout the year both in the Campus 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 includes a recreational Fitness Center and the Wrestling Room, many 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 dance and sport 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 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 Director of Physical Education, Elizabeth Weeks, or the chair for Dance, Susan Cashion, 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 12 units of these activity classes (and/or music activity classes) may be applied toward undergraduate graduation requirements (see the "Undergraduate Degrees" section of this bulletin). Classes that are exempt from this University policy are identified as (PE:X); no limit is placed on PE:X units counting toward graduation.

Auditing/Zero Units — No auditing is allowed in activity classes. Students who wish to take a class but who cannot use, or do not want, unit credit must be full-tuition students. The class is recorded on the Official Study List, indicating no units. Zero-unit enrollment is allowed as space is available, after enrollment for credit, and by consent of instructor. The End Quarter Grade Report and student transcript record enrollment and grades.

Faculty and staff may take an activity class as space is available with instructor consent after student enrollment is completed.

Registration — Registration is held in Roble Gym the day before instruction begins Autumn, Winter, and Spring Quarters. Registration information and alphabetical listings are printed in the Time Schedule each quarter.

Class Fees — Fees are charged for enrollment in aerobics, badminton, horsemanship, fencing, golf, martial arts, sailing, tennis, weight training, windsurfing, 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.

Equipment and Uniforms — No department uniform is required. Students provide their own rackets for badminton and 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 Fitness 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

DANCE ACTIVITY AND THEORY

REGISTRATION

Registration for most dance classes takes place at the first class meeting. Further registration information is printed in the Time Schedule each quarter. Some class sizes are limited.

All courses/classes are coeducational. Only courses with PE:X notations are exempt from the 12-unit activity class limitation policy. Series classes (I, II, III) should be taken in order or with consent of instructor. Selected dance courses may fulfill the Distribution Requirements — see the Appendix.
INTRODUCTORY
Open to all students. No previous dance experience needed.

61. Modern Dance I — Technical and creative principles of modern dance designed to develop the body as an articulate instrument. (PE:X)
   1 unit, Aut, Win, Spr (Cashion)

65. Musical Theater Workshop — (Same as Drama 27.) Dance performance skills and choreography appropriate for musical theater. (PE:X)
   2 units, Win (Cashion)

71. Ballet I — Emphasis on fundamentals of classical technique: alignment, basic barre exercises, and movement sequences in the center and across the floor.
   1 unit, Aut, Win, Spr (Delmar)

75. Mexican Dance and Folklore I — For the novice dancer. Three forms of Mexican dance: regional, popular/social, and religious. Taught for technical and cultural understanding. (PE:X)
   2 units, Aut (Cashion)

77. Dances of Latin America — Selected dances of Latin America, specifically Argentina, Brazil, Chile, Cuba, Mexico, and Puerto Rico.
   1 unit, Aut (Cashion)

81. Jazz Dance I — Jazz dance styles. Emphasis on rhythmic variation, coordination, isolation of body parts, and movement combinations. (PE:X)
   1 unit, Aut, Win, Spr (Kramer)

96. Social Dances of North America I — Introduction to partner dances found in American popular culture: blues, foxtrot, swing, tango, two-step, waltz.
   1 unit, Aut, Win, Spr (Powers)

INTERMEDIATE

160A. Dance History and Philosophy — (Same as Drama 127A.) Historical lecture/survey of Western Theatrical Dance examining changing notions of gender construction and the body in dance over the last 400 years. Ballet and modern dance looked at in the context of social and political events and artistic developments and ideologies. (PE:X) DR:7†(2)
   3-4 units, Win (Ross)

   3-4 units, Spr (Ross)

162. Modern Dance II — Intermediate technique. Introduction of improvisation and composition in directed studies. Prerequisites: two quarters of 61 or equivalent. (PE:X)
   2 units, Aut, Win, Spr (Kramer)

   2 units, Aut, Spr (Frank)

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. (PE:X)
   2 units, Win (Ross, Staff)

166. Public Performance — For students participating in movement oriented performance. (PE:X)
   1 unit, Aut, Win, Spr (Kramer)
   by arrangement

168. Performance Workshop — Workshop explores and develops composition and performance skills. Required for participation in certain faculty and/or student-directed productions. (PE:X)
   2 units, Aut, Win, Spr (Kramer, Frank)

169. Faculty Choreography — Rehearsal and performance of faculty choreography. Selection by audition. (PE:X)
   1 unit, Aut, Win, Spr (Kramer)

172. Ballet II — Intermediate level. Continuation of 71, repeating the fundamentals with increased complexity and introducing additional movement vocabulary. Prerequisite: 71 or equivalent.
   1 unit, Aut, Win, Spr (Powers)

175. Mexican Dance and Folklore II — Emphasis on two to three selected regional dance styles, taught within the framework of their cultural context. Concentration on increasing skill in footwork. (PE:X)
   2 units, Win (Cashion)

176. Mexican Dance and Folklore III — For the intermediate dancer. Taught for increased technical skill and deeper cultural understanding. (PE:X)
   2 units, Spr (Cashion)

177. Dance and Culture in Latin America — (Same as Anthropology 109.) Selected dance forms of Latin America viewed as aspects of human behavior. Emphasis on cultural influences, e.g., European, African, and indigenous, which have shaped ritual and social dance forms of Argentina, Brazil, Chile, Cuba, Mexico, and Puerto Rico. (PE:X) DR:2(*) or 7(2*)
   3-4 units, Spr (Cashion)
ATHLETICS, PHYSICAL EDUCATION, AND RECREATION

182. Jazz Dance II — Intermediate level emphasizing alignment, control, rhythmic coordination, and the learning of movement combinations. Prerequisite: 81 or equivalent. (PE:X)
   1 unit, Aut, Win, Spr (Moses)

183. Jazz Dance III — Advanced level of technical proficiency. Focuses on advancing performance skills of projection and movement quality. Prerequisite: consent of instructor. (PE:X)
   1 unit, Aut, Win (Moses)

185. African-Caribbean Roots of American Jazz Dance — Traditional African and Caribbean dance forms and their influences on American concert jazz dance and American social dance forms. Some live drumming accompaniment. Reading materials and lectures support a dance historical approach. (PE:X)
   2 units, Staff not given 1994-95

186. African-Caribbean Dance Technique — Based on the Katherine Dunham technique which utilizes traditional African diasporic dance forms and contemporary modern dance. Studio work amplified by lectures/reading. (PE:X)
   2 units, Spr (Staff)

187. Improvisation Plus Contact — Development of improvisation skills as a creative process for the craft of choreography; techniques of contact improvisation. (PE:X)
   2 units, Aut, Win (Kramer)

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. (PE:X)
   3 units, Aut, Win (Weeks) TTh 9-10:50

192. Music and Dance — Exploration of the role of music in concert and social dance in various cultures and historical periods. (PE:X)
   Dr. Th (Powers)

195. Leadership Opportunities in Physical Education

PE:X indicates that the course is exempt from the 12-unit policy.

81. Manager: Athletic Team — For student managers of intercollegiate teams. Prerequisite: consent of respective varsity team head coach.
   1 unit, Aut, Win, Spr (Staff)

120. Teacher Training: Student Assistant — Directed observation, individual and group instruction, organization, supervision and assistance; evaluation of skill performances, and other activities as directed by master teacher. Prerequisite: consent of instructor.
   1 unit, Aut, Win, Spr (Staff) by arrangement

142. Teacher Training: Student Assistant — Directed observation, individual and group instruction, organization, supervision and assistance; evaluation of skill performances, and other activities as directed by master teacher. Prerequisite: consent of instructor.
   1 unit, Aut, Win, Spr (Staff) by arrangement

143. Teacher Training: Sport Internship — Beginning Level — For highly skilled students in a given sport seeking experience in teaching/coach-
ing at beginning level of sport. Work under close guidance of experienced teacher/coach. Lesson plans, organization and evaluation of practice, teaching, skill demonstrations, paper relevant to sport. Prerequisite: consent of instructor. (PE:X)

2 units, Aut, Win, Spr (Staff)

by arrangement

144. Teacher Training: Sport Internship — Intermediate Level — Same as 143, teaching at intermediate level of sport. (PE:X)

2 units, Aut, Win, Spr (Staff)

by arrangement

145. Teacher Training: Sport Internship — Advanced Level — Same as 143, teaching at advanced level of sport. (PE:X)

2 units, Aut, Win, Spr (Staff)

by arrangement

AQUATIC ACTIVITY AND THEORY

Most courses below are subject to the 12-unit limitation policy. PE:X indicates exemption from the 12-unit limitation policy. Activities are listed alphabetically by title.

78. Lifeguard Training — Increases awareness of water hazards and accident prevention. Victim recognition, rescue skills, and development of speed and endurance. Lifeguard responsibilities and facilities operation. Current adult CPR and Standard First Aid required for Red Cross Lifeguard certification. Priority to those with summer jobs requiring certification; bring letter from employer to first class meeting. Prerequisite: pass swim test; see instructor for details.

1 unit, Spr (Weeks)

107. Sailing: Beginning — Basic skills, theory, and techniques to enable beginners to sail with confidence. Fee.

1 unit, Aut, Spr (Middleton)

108. Sailing: Intermediate — Refinement of skills. Introduction to racing. Fee. Prerequisite: consent of instructor.

1 unit, Aut, Spr (Middleton)

109. Sailing: Advanced — Refinement of heavy weather sailing skills, with emphasis on racing. Fee. Prerequisite: 108 or consent of instructor.

1 unit, Spr (Middleton)

110. Sailing: Keelboat — Application of small-boat sailing skills to intermediate-size keelboats. Focuses on safety and seamanship skills and spinnaker handling. Fee. Prerequisite: 108 or consent of instructor.

1 unit, Aut, Spr (Middleton)

130. Swimming I: Beginning — For non-swimmers or those who can swim about 10 yards but are not comfortable in deep water. Includes instruction in safety skills, front crawl, and a back stroke. Additional strokes introduced as ability warrants.

1 unit, Aut, Spr (Weeks, Dettamanti)

131. Swimming II: Advanced Beginning — For those with limited swimming ability and safety skills. May not be fully comfortable in deep water. Includes 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.

1 unit, Aut, Win, Spr (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 and sidestroke. Open turns. Introduction to conditioning. Prerequisites: fair technique in crawl, elementary backstroke, backstroke, and sidestroke; ability to swim approximately 100-200 yards continuously by mixing strokes.

1 unit, Aut, Win, Spr (Weeks, Kenney)

133. Swimming IV: Advanced — Review and refinement of all basic strokes and safety skills. Butterfly and flipturn introduced. Includes stroke drills and information on conditioning and designing individual workouts. Prerequisite: average to good strokes; ability to swim approximately 400-500 yards continuously.

1 unit, Aut, Win, Spr (Kenney, Dettamanti, Quick, Gerry)

134. Swim Conditioning — For students wanting to improve cardio-respiratory endurance through directed swimming workouts. Prerequisite: advanced swimmer.

1 unit, Aut, Win, Spr (Gerry, Dettamanti, Quick, Knapp)


1 unit, Win (Quick) by arrangement

166. Water Polo: Beginning — Introduction to basic skills and game play. For those who have never played or have had limited experience.

1 unit, Spr (Dettamanti)


1 unit, Aut, Spr (Dettamanti)

171. Water Safety Instructor — Learning to teach swimming and basic and emergency 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 if want priority. Prerequisites: 17 years of age, swimming skills at Red Cross Learn to Swim Level VI (advanced swimmer) (pass test) and pass a water safety skills test and written test. See instructor for details. (PE:X)

3 units, Spr (Weeks)

1 unit, Spr (Middleton)

FITNESS, INDIVIDUAL, AND TEAM SPORT ACTIVITIES

Most courses below are subject to the 12-unit limitation policy. PE:X indicates exemption from the 12-unit limitation policy. Activities are listed alphabetically by title.

3. Aerobics: Low Impact — Beginning/Intermediate — Continuous, total body movement at low intensity designed to enhance cardiovascular capacities. Focuses on body awareness and creation of a balance between controlled, powerful exercises that develop strength and large, fluid, ongoing movements that promote flexibility. Fundamentals of form and basic routines. Fee.
1 unit, Aut, Win, Spr (Coughlin)

4. Aerobics: Low Impact: Intermediate/Advanced — Continuous, total body movement at high intensity to enhance cardiovascular capacities. Focuses on body awareness and creation of a balance between controlled powerful exercises that develop strength and large, fluid, ongoing movements that promote flexibility. Fundamentals of form and challenging routines. Fee.
1 unit, Aut, Win, Spr (Coughlin)

1 unit, Aut, Win, Spr (Dettamanti, Corlett)

1 unit, Aut, Win, Spr (Staff)

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.
1 unit, Aut, Win, Spr (Lananna, Reiff)

1 unit, Aut, Win (Posthumus, Tulum)

39. Fencing: Intermediate/Advanced — Continuation of 38; introduction of electrical foil fencing. Fee. Prerequisite: 38 or consent of instructor.
1 unit, Aut, Win (Tulum)

42. Fencing Officiating — Supervised bouting with application of rules and officiating technique. Prerequisite: 39 or consent of instructor.
1 unit, Spr (Posthumus, Tulum)

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.
1 unit, Aut, Win, Spr (Staff)

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.
1 unit, Aut, Win, Spr (Stotz, 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.
1 unit, Aut, Win, Spr (Stotz, Miller)

56. Golf: Tournament — Advanced drills and practice on golf course for experienced players of near-varsity-level ability. Instruction and participation in medal and match play events. Fee. Prerequisites: advanced golf or previous tournament play, consent of instructor.
1 unit, Win (Goodwin)

59. Gymnastics: Beginning — Fundamental gymnastics movement for men and for women, including various flexibility and strength exercises taught on the Olympic apparatus (such as floor, balance beam, bars, rings, etc.).
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.
1 unit, Aut, Win, Spr (Greenwood)

65. Horsemanship: Beginning Riding — No background or very little. Includes walk, trot, and canter. Fee.
1 unit, Aut, Win, Spr (Saxe, Staff)
   1 unit, Aut, Win, Spr (Saxe, Staff)

   1 unit, Aut, Win, Spr (Saxe, 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.
   1 unit, Aut, Win (Weeks)

121. Soccer: Beginning/Intermediate — Introduction to soccer. Includes skills of passing, shooting, control, dribbling and general offensive and defensive tactics and rules.
   1 unit, Aut, Win, Spr (Lindores, Sawyers)

122. Soccer: Intermediate/Advanced — Review of the basic skills and rules. More in-depth work on offensive and defensive tactics. Includes work and scrimmage time.
   1 unit, Aut, Win, Spr (Lindores, Sawyers)

123. Soccer: Advanced for Women — Technique under pressure, group and team tactics, introduction of modern system of play. Prerequisites: consent of instructor, tryouts in Spring for enrollment.
   1 unit, Aut, Win, Spr (Sawyers)

129. Strength Training: Advanced — Designed around Olympic-style lifting (cleans, jerks, snatches, high pulls). Prerequisites: intermediate weight training or equivalent, consent of instructor.
   1 unit, Win, Spr (Saxe, Staff)

148. Tennis: Beginning — Fundamental strokes (forehand, backhand, serve, and net play), rules, and scoring. Fee.
   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.
   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.
   1 unit, Aut, Win, Spr (A. Gould, Horpel, Whittinger, Forood, Pearce)

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.
   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.
   1 unit, Aut, Win, Spr (Brennan, D. Gould, Whittinger)

154. Tennis: Computennis Scoring Techniques — 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.
   2 units, Aut, Win, Spr (Brennan, D. Gould)

   1 unit, Aut, Win, Spr (Shaw)

161. Volleyball: Intermediate — Drills to improve skills and game playing strategy. As ability indicates, more emphasis on team play and strategy.
   1 unit, Aut, Win, Spr (Shaw)

162. Volleyball: Advanced — Refinement of all skills emphasizing offensive and defensive team play. Prerequisites: strong skills and general knowledge of team concepts.
   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 thor-
ough knowledge of basic weight training principles.
Fee.
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.
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. No experience necessary.
1 unit, Spr (Horpel)

MARTIAL ARTS
All classes below are subject to the 12-unit limitation policy.

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.
1 unit, Aut, Win, Spr (Doran)

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.
1 unit, Aut, Win, Spr (Minneti)

1 unit, Aut, Win, Spr (Minneti)

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.
1 unit, Aut, Win, Spr (Blair)

95. Tae Kwon Do — Training in the 2,000 year-old Korean martial art. Develops flexibility, speed, power, and mental and physical strength. Traditional forms, kicking, free-sparring, and self-defense techniques. All levels welcome. Fee.
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.
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.
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.
1 unit, Aut, Win, Spr (Chuck)

INTERCOLLEGIATE ATHLETIC TEAMS
All classes below are subject to the 12-unit limitation policy.

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)
1-2 units, Aut, Win, Spr (Marquess, Stotz)
MTWThF 1:30-4:30
17V. Basketball: Varsity (men’s and women’s teams)
  1-2 units (Montgomery, Staff) men’s team
    Aut, MTWThF 3:30-6:30
    Win, MTWThF 12:30-3:30
  1-2 units (Van Derveer, Staff) women’s team
    Aut, MTWThF 12:45-3:30
    Win, Spr, MTWThF 3:30-6

26V. Crew: Varsity (men’s and women’s teams)
  1-2 units (Kujda) men’s team
    Aut, MTWTh 3:15-6 F 6-8
    Win, Spr, MTWTh 3:15-6 F 6-8 S 7-10
  1-2 units (McCandless) women’s team
    Aut, MTWThF 3:15-6
    Win, MTWThF 3:15-6 S 7-10

29V. Cross Country: Varsity (men’s and women’s teams)
  1-2 units, Aut (Lananna) MTWThF 3:30

35V. Diving: Varsity (men’s and women’s teams)
  1-2 units (Schavone)
    Aut, Win, MWF 1-5 TTh 2-5
    Spr, MTWThF 2-5

41V. Fencing: Varsity – Men’s foil, épée, and saber teams and women’s foil team.
  1-2 units (Tulum, Posthumus)
    Aut, Win, MTWThF 3:30-5:30

46V. Field Hockey: Varsity (women’s team)
  1-2 units (Johnson)
    Aut, MTWThF 3:30-5:30
    Win, MTWThF 5-10
    Spr, MTWThF 3:30-5:30

49V. Football: Varsity (men’s team)
  1-2 units (Walsh, Staff)
    Aut, TTh 4-6 F 4-4:30
    Win, MTWThF 3:30-5
    Spr, MWF 3:30-5 S 9:30-12

57V. Golf: Varsity (men’s and women’s teams)
  1-2 units (Goodwin) men’s team
    Aut, Win, Spr, MTWThF 1-4
  1-2 units (Baldwin) women’s team
    Aut, Win Spr, MTWThF 1-5

62V. Gymnastics: Varsity (men’s and women’s teams)
  1-2 units (Hamada) men’s team
    Aut, Win, Spr, MTWThF 2:30-5:30 S 9-12
  1-2 units (Greenwood) women’s team
    Aut, SuMTThF 2:30-5:30
    Win, SuMTThF 2-6
    Spr, MWF 3-5

75V. Lacrosse: Varsity (women’s team)
  1-2 units, Aut, Win, Spr (Cowperthwait)
    Aut, MTWTh 3:15-5:30
    Win, Spr, MTWThF 3:15-5:30

111V. Sailing: Varsity (coed and women’s teams)
  1-2 units (Bourdow)
    Aut, Spr, MWF 2:30-6
    Win, WF 2:30-6

124V. Soccer: Varsity (men’s and women’s teams)
  1-2 units (Lindores) men’s team
    Aut, MTWThF 3:30-5:30
    Win, MWF 3-6
    Spr, MTWThF 3:30-5:30
  1-2 units (Sawyers) women’s team
    Aut, MTWThF 3:15-5:15

127V. Softball: Varsity (women’s team)
  1-2 units, Aut, Win, Spr (Pearce)
    MTWThF 2-5

136V. Synchronized Swimming Team (women’s team)
  1-2 units, Aut, Win (Weir)
    Su 8:30-12 T 6-8 p.m. Th 6-8 S 9:30-12

137V. Swimming: Varsity (men’s and women’s teams)
  1-2 units, Aut, Win, Spr
    (Kenney) men’s team
    MTWThF 6-8, 2:15-4:30 S 7-10
    (Quick) women’s team
    MTWThF 6-8, 2:15-4:30 S 7-10

153V. Tennis: Varsity (men’s and women’s teams)
  1-2 units, Aut, Win, Spr
    (Gould) men’s team
    MTWThF 2:30-5:30
    (Brennan) women’s team
    MTWThF 2:30-5:30

157V. Track and Field: Varsity (men’s and women’s teams)
  1-2 units, Aut, Win, Spr (Lananna)
    MTWThF 2-5

163V. Volleyball: Varsity (men’s and women’s teams)
  1-2 units (Nieves) men’s team
    Aut, MTWThF 1-4
    Win, Spr, MTWThF 4-7
  1-2 units (Shaw) women’s team
    Aut, MTWThF 4-7
    Win, Spr, MTWThF 1-4

168V. Water Polo: Varsity (men’s team)
  1-2 units (Dettamanti)
    Aut, MTWThF 2:30-5
    Win, MTWTh 3:30-5:30
    Spr, MTWTh 3:30-5:30

184V. Wrestling: Varsity (men’s team)
  1-2 units (Horpel)
    Aut, MTWThF 3:15-5:30, S 10-12
    Win, MTWThF 3:15-5:30, M 10-11 p.m.
    W 12-12:30 S 10-12
    Spr, MWF 4:30-5:30 TTh 3-4
BIOLOGICAL SCIENCES

EMERITI: (PROFESSORS) Daniel Mazia, David D. Perkins, Colin S. Pittendrigh, John H. Phillips, Jr., David C. Regnery, Dow O. Woodward; (by courtesy) C. Stacy French

CHAIR: Patricia P. Jones

ASSOCIATE CHAIR: to be announced


ASSOCIATE PROFESSORS: Mark W. Denny, William F. Gilly, Ron R. Kopito, Robert M. Sapolsky, Stuart H. Thompson; (by courtesy) Richard Scheller

ASSISTANT PROFESSORS: Barbara A. Block, Martha S. Cyert, Deborah M. Gordon, Paul M. MacDonald, Susan K. McConnell, Michael A. Simon, Timothy P. Stearns; (by courtesy) Neil S. Hoffman, Shauna C. Somerville

PROFESSOR (RESEARCH): R. Paul Levine

LECTURERS: Sara Fultz, Fran Thomas

DIRECTOR OF SYSTEMATIC COLLECTIONS: John H. Thomas (Dudley Herbarium)

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 coterminal program leading to the M.S. degree, (4) a terminal program leading to the M.S. degree, and (5) 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 amphibians, 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 systemsatics 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 UNDERGRADUATE 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, and other departmental forms and informational handouts.

The BioBridge is a student-staffed organization that assists the Student Services office. BioBridge staff members are available for informal, drop-in counseling for prospective and declared majors. The BioBridge offers advice on declaring the major, choosing an adviser, finding research positions, and selecting courses. Members also organize department activities such as the weekly noon lecture series, Biology 2.

Each declared major in Biological Sciences is required to select a department adviser upon declaring the major. 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.

**COURSE 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>
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<tr>
<td>Biology 32</td>
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</tr>
<tr>
<td>Biology 33</td>
<td>5</td>
</tr>
<tr>
<td>Biology 44X</td>
<td>4</td>
</tr>
<tr>
<td>Biology 44Y (may be replaced by 4 units of 175H)</td>
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<td>Total</td>
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<td>Electives</td>
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**Required Cognate Courses** —

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 51, 53, 55.
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. Students may take up to two cognate courses +/NC.

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. Flow charts with suggested courses for students interested in several subdisciplines are available in the Student Services office.

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: Bio. 121 or Bio. 160H
   - Developmental Biology: Bio. 123
   - Genetics: Bio. 118 (may be used to satisfy either area I or area II requirement)
   - Macromolecules: Bio. 116

3. **Organismal**
   - Comparative Animal Physiology: Bio. 162H
   - General Botany: Bio. 120
   - Human Physiology: Bio. 112
Invertebrate Zoology: Bio. 161H
Microbiology: Microbio. & Imm. 101
Neurobiology: Bio. 153
Vertebrate Zoology: 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

No more than 6 units from any combination of individual instruction courses (143, 175H, 178, 194, 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 +/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, or (Physics 51, 52, 53, 54, 55, 56, 57, 58).

For students considering residence at Hopkins Marine Station for Winter and/or Summer Quarter during the junior or senior year, or an overseas program, the department recommends fulfilling as many University Distribution Requirements as possible in the first two years at Stanford. A student may petition that 175H count 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. &amp; Units</th>
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<tbody>
<tr>
<td>Chem. 31, 33, 35, 36</td>
<td>A W S</td>
<td>4 4 7</td>
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<tr>
<td>Math. 19, 20, 21. Calculus and Analytic Geometry</td>
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SECOND YEAR

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<td>A W S</td>
</tr>
<tr>
<td>Bio. 32. Principles of Biology</td>
<td>5</td>
</tr>
<tr>
<td>Bio. 33. Principles of Biology</td>
<td>5</td>
</tr>
<tr>
<td>Bio. 44. Core Experimental Laboratory</td>
<td>4 4</td>
</tr>
<tr>
<td>Chem. 130 or 132, 131, 135 (or 171)</td>
<td>8 3</td>
</tr>
<tr>
<td>Distribution Requirements or Electives</td>
<td>3 5 8</td>
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<tr>
<td>Totals</td>
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THIRD YEAR

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<tbody>
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<td>Physics 21, 22, 23, 24. Introductory Physics</td>
<td>4 4</td>
<td></td>
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<tr>
<td>Distribution Requirements or Electives</td>
<td>11 11 15</td>
<td></td>
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<tr>
<td>Totals</td>
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FOURTH YEAR

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<tr>
<td>Electives</td>
<td></td>
<td>15 15 15</td>
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</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 get 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 advisor 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 will be kept in the student's file. This departmental procedure is separate from 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 in advance 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 by petition within one quarter of 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 taken for a letter grade of an approved 199 research project; (2) obtain at least an average of 3.0 (B) letter grade indicator (LGI) in all Biological Sciences major requirements taken at Stanford (cognate, core, and elective courses). Grades earned from directed reading (198), teaching (290), and research (175H or 199) are not computed into this LGI; (3) submit an honors petition proposal to the department’s Undergraduate Studies Committee by January 13 if graduating Spring Quarter and by mid-quarter (fifth Friday) prior to graduation in any other quarter; (4) if graduating in June, participate in the Achauser Honors Symposium, which takes place Spring Quarter (or, if graduating in a quarter other than spring, produce a poster); and (5) complete and submit by the end of the quarter of graduation two signed 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). Further information on the honors program is available from the Student Services office.

PREMEDICAL, PREDENTAL, AND PREPARAMEDICAL REQUIREMENTS

Premedical, predental, and preparamedical 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 Premedical Advising office (Undergraduate Advising Center, Sweet Hall).

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 should 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 LGI 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 medically oriented course work and research experience, and to undergraduate science majors wishing to increase or update their science background or obtain advanced research experience. The program is open to qualified students who have earned a B.S. degree. Students who have majored in related fields are eligible to apply, but must complete, or have completed, 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. Currently, there are no specific courses required. Each candidate designs a coherent program of study in consultation with his or her adviser, who then must sign the required Program Proposal during the first quarter of enrollment.

To apply, students submit an application for admission to the M.S. program, two letters of recommendation, an official transcript, and official Graduate Record Examination (GRE) or MCAT scores. Financial support is not available from either the department or the University for students in this program.

MASTER OF ARTS IN TEACHING

The Master of Arts, Teaching degree is offered jointly by this department and the School of Education. The degree is intended for candidates 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. Detailed requirements are outlined in the “School of Education” section of this bulletin or may be obtained from the Admissions Director, School of Education.
TEACHING CREDENTIALS

For information concerning the requirements for teaching credentials, consult the “School of Education” section of this bulletin or address an inquiry to the Credential Administrator, School of Education.

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 disciplines, particularly the physical sciences, are also encouraged 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 recommended that preparation for graduate work include courses in chemistry through organic chemistry, general physics, and mathematics through calculus. Reading knowledge of a foreign language is recommended.

Application, Admission, and Financial Aid — Prospective graduate students should request application information, instructions, and materials from Graduate Admissions, the Registrar’s Office. The department’s program is divided into two separate tracks — one in Population and Organismal Biology and the other in Molecular/Cell/Integrative Biology. Applications to the two tracks are evaluated separately; all applicants should specify which track they want. 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 applicants.

Admitted students normally are offered financial support in the form of biology research assistantships, NIH traineeships, or Biological Sciences fellowships. Such awards are for one year and, assuming continuing excellent performance, are renewable as funds permit. It is current policy not to offer financial support from department-derived funds beyond the fourth year of graduate study. Grants awarded to individual professors typically support Ph.D. graduate students beyond their fourth year of study, if necessary.

Qualified applicants should apply for predoctoral, 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 financial aid officers for information and applications.

An admitted applicant is required to fulfill the requirements of the University as outlined in the “Advanced 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 faculty members. Course work is planned in consultation with an advising committee assigned for his or her track.

Teaching experience and training are part of the graduate curriculum. Each student assists in teaching two courses in the department’s core lecture (31, 32, 33) or lab courses (44X, 44Y), and an advanced course in the student’s area of specialization.

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 Campus Report. Graduate students are expected to attend.

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) Bio. 301: daily one hour sessions are held the first three weeks of Autumn Quarter. 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.

- Genetics 203
- Biology 214
Biochemistry 201

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 on special circumstances and is not routinely granted.

c) Seminar: each student must present a public seminar that is evaluated by two faculty members. 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.

d) Thesis Lab: by the end of Spring Quarter, each first-year student is expected to have selected a lab in which to perform thesis research and to have been accepted by the faculty member in charge. 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 laboratory, such as Developmental Biology or Plant Biology. Students electing to do a summer rotation at the Hopkins Marine Station may postpone selection of a laboratory for their thesis 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 thesis 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 student's Advising 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 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 for the function.)

b) Thesis Proposal: before the end of Spring Quarter of the second year, the student must prepare a thesis proposal that outlines the student's projected thesis research at the same level as was expected for the alternative proposal. After submission of the thesis proposal to the 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 Advising Committee and the Graduate Committee representative.

Advancement to candidacy is contingent on satisfactory completion of the alternative proposal and oral exam. Failure to complete these requirements on schedule will result in the withholding of graduate stipend.

3. Fourth Year and Beyond: each student must meet with the Advising Committee at the beginning of the Autumn Quarter of the fourth year and each year thereafter. The committee signs a form to ensure compliance.

4. Final Oral Exam: the finished thesis must be turned in to the student's Reading Committee at least one month before the oral exam is planned. At least two 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.

Population and Organismal Biology Ph.D. Track Requirements —

1. First Year: each entering student is assigned a supervisory committee of three faculty members whose function is to develop an appropriate schedule of required and recommended courses and to meet once each quarter with the student during the first year.

a) The "Committee of the Whole," that is, all population biology faculty, may meet with each student individually early in the first year.
b) Seminar: each student must present a public seminar that is evaluated by two faculty members. Evaluation consists of meeting with each faculty member within one week following the seminar to discuss the seminar and to obtain signatures.

2. Second Year: during the second year, the student is expected to write two proposals, one a major thesis proposal, the other on a different topic. The thesis proposal is evaluated by a committee of three faculty in an oral presentation. The other is evaluated in written form by two faculty members. These should be completed by the end of Spring Quarter of the second year. Advancement to candidacy depends on satisfactory completion of the thesis proposal.

3. Fourth Year and Beyond:
   a) Mandatory Advising Committee meetings begin the fourth year and each year thereafter. A form with signatures is required.
   b) Oral Exam: at least one month before the oral exam takes place, the student must submit his or her thesis to the Thesis Committee, which then becomes the Thesis Reading Committee. At least two weeks before the oral exam, the student must incorporate into the thesis any changes required by the committee. The exam cannot be formally scheduled or publicly announced until that time.

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 three years (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

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

1. Introduction to the Science of Life — For general students who wish an introduction to the conceptual structure of biology. Three meetings each week focus on fundamental themes in biology: physical and chemical basis of life, mechanisms of inheritance, and evolution of environment adaptation and living diversity. A fourth weekly meeting focuses on implications of biological ideas for broad intellectual and social issues. Discussions, by arrangement, help students with assigned problems and essays. DR:5(7)
   5 units, Spr (Watt, Staff) TWThF 10

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, Aut, Win (Staff) Th 12:15

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, Sum (Staff) MTWTh 9

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, and 21 or 41 and 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, 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 (Simoni, Macdonald, Simon) MTWTh 10 plus optional discussion sections

32. Cell, Developmental, and Physiologic 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 adapt-
ing organisms to different environments. The mechanisms by which the functions of each system are controlled and regulated. Prerequisites: see above.

5 units, Win (Cyert, McConnell, Heller, Sapolsky) MTWTh 10
plus optional discussion sections

33. Plant and Population Biology — Core lecture covering plant physiology and development, biodiversity, evolution, and ecology. Topics: 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 (Vitousek, Ray, Gordon) MTWTh 10 plus discussion sections

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. 44X and Y are writing focus classes. Lab fee. Prerequisites: Chemistry 31 and 33. Recommended: Biology or Human Biology core and statistics; 44X and Y should be taken sequentially in same year.

44X. 4 units, Win (Staff)
lab T or W 4:30-9:30 p.m., Th or F 12:30-5:30

44Y. 4 units, Spr (Staff)
lab M or T 4:30-9:30 p.m., M, W, Th, or F 12:30-5:30

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) Th 1:30-5

INTERMEDIATE
UNDERGRADUATE AND GRADUATE

110. Vertebrate Biology — (Same as Human Biology 110.) 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 units, Spr (Porzig) TTh 11-12:15

110L. Vertebrate Biology Lab — (Same as Human Biology 110L.) 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. Prerequisite: current or previous enrollment in 110/Human Biology 110.

3 units, Spr (Porzig)

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 (Watt, Feldman, Ehrlich) given 1995-96

112. Human Physiology — (Same as Human Biology 111.) 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 (Heller, Harris) not given 1994-95

116. Macromolecules — Structure and function of protein, nucleic acids, and membranes and the roles they play in cellular processes. Focus is on biochemistry and biophysics of macromolecules, how macromolecules interact to form cellular structures, and how molecular machines perform work in the cell. Enrollment limited to 40. Prerequisite: Biology core.

3 units, Aut (Stearns) MWF 2:15

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) MWF 11

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. Prerequisites: Biology core.

4 units, Spr (Cyert, Simon) MWF 11

119. Intermediate Molecular Biology — Molecular analysis of genes and gene action in prokaryotic and eukaryotic systems. Regulation at transcriptional, translational, and post-translational levels. Emphasis is on understanding experimental design and interpretation. Prerequisite: Biology core.

3 units, Win (Schimke, Yanofsky) MWF discussion by arrangement
120. General Botany — The diversity of plant groups plus an introduction to the structure, development, physiology, and ecology of higher plants. Prerequisites: Biology or Human Biology core, or consent of instructor.

5 units, Aut (Fultz, Green, Mooney, Ray) MWF 11, lab T or W 2:15-5:05 plus discussion

121. Cell Biology — A molecular approach to the study of cellular structure and function. Topics: evolution and assembly of cell structures and organelles; biomembranes; cytoskeleton and motility; cell growth and differentiation; cell-cell interactions, signal transduction, and role of oncogenes. Emphasis is on an experimental perspective focusing on the design of experiments and critical analysis of data. Prerequisites: Biology core.

4 units, Win (Kopito) TTh 9-10:30 discussion one hour weekly by arrangement

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 on experimental approaches (embryological, genetic, molecular biological) and their design and interpretation. Prerequisites: 31, 32. Recommended: 118.

3 units (Macdonald) alternate years, given 1995-96

124. Ecosystem Physiology — The physiological ecology of plants, ecosystems, and landscapes. Prerequisites: 32, 33; or consent of instructor.

4 units (Mooney, Berry, Field) alternate years, given 1995-96

125. Ecosystems of California — Principles of ecosystem function with emphasis on vegetation components and on California systems. Prerequisite: Human Biology 2A.

3-4 units, Spr (Mooney) TTh 11

128. Systematics and Ecology of Vascular Plants — Lectures, lab, field studies. Prerequisite: consent of instructor.

4-5 units, Spr (J. Thomas) WF 1:15 lab WF 2:15-5:05 field trips by arrangement

130. Algae/Fungi — Introduction to these groups, their utilization in studying biological problems and their ecological significance. Lectures, lab, field trips. Prerequisite: 33 or equivalent.

4 units, Win (Fultz, Grossman) MWF 1:15 lab T 2:15-5:05 alternate years, not given 1995-96

131. Mosses and Ferns — Structure, development, and evolutionary relationships of mosses and ferns.

Lectures, lab, field trips. Prerequisites: 32, 33; or consent of instructor.

5 units, Aut (J. Thomas) alternate years, not given 1995-96

132. Seed Plants — Structure, development, and evolutionary relationships of seed plants. Lectures, lab, field trips. Prerequisites: 32, 33; or consent of instructor.

4 units (J. Thomas) alternate years, given 1995-96

133. Plants and Civilization — Economic uses of plants and plant substances. Food, fiber, medicinal, and structural uses from a biological and ecological point of view. Lectures and demonstrations. Prerequisites: Biology or Human Biology core, or consent of instructor.

4 units (J. Thomas) alternate years, given 1995-96

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 12 advanced undergraduates. Prerequisites: 31 and/or consent of instructor.

3 units, Aut (Hanawalt) alternate years, not given 1995-96

137. Plant Genetics — Gene analysis, mutagenesis, and transposable elements; developmental genetics of flowering and embryo development; biochemical genetics of plant metabolism; and lessons from transgenic plant studies. Prerequisite: 118 or consent of the instructor.

3 units, Spr (Walbot) alternate years, not given 1995-96

139. Biology of Birds — (Formerly 189) 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. Two three-hour lecture/lab/field trips per week. Enrollment limited to 20. Prerequisites: 33 equivalent, birding experience, and consent of instructor.

3 units (Ehrlich) alternate years, given 1995-96

140. Population Biology of Butterflies — (Formerly 190) Lectures on field studies of the dynamics and genetics of butterfly populations, life histories, and resource utilization. Also, 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.
141. Biostatistics—Introduction to the statistical analysis of biological data. Lectures, discussion, and student exercises. DR:4(6)
2-5 units, Win (Ehrlich) alternate years, not given 1995-96

3 units, Aut (Roughgarden) TTh 2:30-3:45

143. Ecological Field Studies—(Formerly 178.) Introduction to independent study of natural biotic systems. Jasper Ridge Biological Preserve serves as an outdoor lab. Prerequisite: consent of instructor.
4 units, Spr (Chiariello, Cohen, Mooney) by arrangement

144. Conservation Biology—(Formerly 180; 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. Prerequisites: 33, Human Biology 2A, or consent of instructor.
4 units, Win (Boggs, Launer) MWF 10

145/245. Behavioral Ecology—(Formerly 181/281; graduate students register for 345.) 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 core, Human Biology core, or consent of instructor. Recommended: statistics.
4 units, Spr (Gordon) TTh 9 seminar by arrangement

146. Colloquium on Population Studies—(Formerly 183; same as Human Biology 60.) Series of talks by distinguished speakers introducing a variety of approaches to population and resource studies.
1 unit, Win (Feldman) W 4:15-5:30

147. Colloquium on Biosystematics and Evolution—(Formerly 185.) 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, Spr (Watt)

149. Neural Basis of Sleep and Circadian Rhythms—(Same as Human Biology 124.) Review of current research. The phenomenon of sleep from neurophysiological, neurochemical, and neuroendocrinological aspects. The pathology of sleep, thermoregulation and sleep, hibernation, and the interactions between sleep pattern and circadian rhythms. Enrollment limited to 20. Prerequisite: 32, Human Biology 4A, or equivalent.
3 units, Aut (Heller)

150/250. Human Behavioral Biology—(Formerly 163/263; graduate students register for 250, same as Human Biology 109.) 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.
5 units (Sapolsky) alternate years, given 1995-96

151. Vegetation and Fire—(Formerly 168.) The past and present role of fire in the evolution and maintenance of vegetation types, with reference to the diverse California flora. Prerequisite: consent of instructor.
3 units, Win (J. Thomas) W 2:15-4:05 alternate years, not given 1995-96

152. Microscopy for Biologists—(Formerly 170; 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 studies and video/digital image processing. Lectures on physical principles; involves partial assembly and extensive use of the instruments in projects. Prerequisites: some college physics, Biology core.
3 units, Spr (S. Smith, Green) TTh 1:15 plus lab by arrangement

153. Cellular Neuroscience: Cell Signaling and Behavior—(Same as Psychology 107.) Survey of neural interactions underlying behavior. Prerequisites: 1 or equivalent, and elementary biology.
4 units, Aut (Wine) TTh 1:15-2:30

154. Human Development—(Same as Human Biology 156.) Biological, medical, and social aspects of normal and abnormal human development. Topics: in vitro fertilization and embryo transfer; gene and cell therapy; gametogenesis and imprinting; 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 cocaine, alcohol, and teratogens; sex determination and differentiation; growth control; gigantism.
and dwarfism; neural tube defects; cardiac morphogenesis; current knowledge of the developmental biology of humans. Three hours lectures plus one hour required discussion section per week. Limited enrollment. Prerequisites: Human Biology or Biology core, or consent of instructor.

5 units, Aut (Porzig)

156. Plant Physiology — Physiological functions of land plants from analytical and quantitative points of view; photosynthetic energy and gas exchange; water and photosynthetic 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) alternate years, given 1995-96

157. Plant Biochemistry — Biochemical basis of plant structure and function: mechanisms of photosynthesis and plant respiration; mineral metabolism, including \( \text{N}_2 \) fixation; special features of plant nuclear and organelle genomes; cell wall polymers; protein and polysaccharide biosynthesis and its regulation; formation and mobilization of storage reserves; biosynthetic pathways for hormones, pigments, and other secondary products. Prerequisites: Biology core or consent of instructor. Recommended: 120, Biochemistry 200.

3 units, Win (Ray, Grossman, Berry) alternate years, not given 1995-96

158/258. Developmental Neurobiology — (Graduate students register for 258.) Lecture seminar for advanced undergraduates and graduate students. Principles of nervous system development from the molecular control of development and the role of cell-cell interactions and trophic factors, to the level of neural system and the role of experience in influencing brain structure and function. Topics: cell lineage, neurogenesis, neuronal migration, axon pathfinding and elongation, synaptic stabilization, and critical periods in development. Prerequisites: 32 or equivalent; 153 or Neurobiology 200, or consent of instructor.

4 units, Spr (McConnell) MWF 9-10:30 alternate years, not given 1995-96

HOPKINS MARINE STATION

Note that several of these courses can be used to fulfill department menu requirements and that completion of the Biology core is a prerequisite for all of these courses. For course descriptions, see Hopkins Marine Station section.

160H/260H. Cell Physiology

4 units, Win (Epel, Gilly, Thompson) alternate years, not given 1995-96

161H/261H. Invertebrate Zoology

4 units, Win (Staff)
activities outside of Stanford. Extensive report on the experience is required. No more than 10 cumulative units.

1-10 units, Aut, Win, Spr (Staff) by arrangement

198. 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.

198H. Undergraduate Research — For undergraduate research 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. Completion of 10 units of 199 required for graduation with department honors. See description of honors program above.

199H. Undergraduate Research — For undergraduate research done under supervision of Hopkins Marine Station faculty.

ADVANCED UNDERGRADUATE AND GRADUATE

203. Advanced Genetics — (Same as Genetics 203.) 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 (Botstein, Baker) TTh 9

205. DNA Repair and Mutagenesis — (Same as Pathology 292.) 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) alternate years, not given 1995-96

208. Developmental Biology — (Same as Developmental Biology 210.) 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). Acquaints graduate students and upper-level undergraduates with advances in current developmental biology. 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 (Baker, Clayton, Crabtree, Fuller, Hogness, Kaiser, Kim, Kingsley, Nusse, Scott, Shapiro, Spudich, Weissman) not given 1994-95

209. Advanced Neurosciences Laboratory — (Same as Human Biology 179.) The use of equipment and techniques required to record and analyze extracellular and intracellular neural activity in vertebrates and invertebrates. In-depth training in a subset of these techniques as applied to a specific research project. Enrollment limited to 10; admission by application (available in Student Services office). Prerequisites: Biological Sciences or Human Biology core sequence and core lab (44 or equivalent). Recommended: some advanced course work in neurobiology.

4 units (Heller)

213. Viruses — Principles of virus growth, genetics, architecture, and assembly. Relation of temperate viruses and other episomes to the host cell. Prerequisite: 31.

3 units, Win (Campbell) MWF 9

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) MWF 9-10:50

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 genet-
ics; macromolecular phylogeny and protein clocks. Prerequisites: Biology core or substantial equivalent.

3 units, Win (Watt) TTh 8:35-9:50

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, Spr (Vitousek) TTh 2:15-3:30

217. Climate Theory, Modeling, Applications and Implications — History of the co-evolution 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 (Schneider)
alternate years, given 1995-96

228. Advanced Plant Systematics — Individual study of various aspects of the systematics of vascular plants, depending on the interests of students. Prerequisite: consent of instructor.

2-5 units, Aut, Win, Spr (J. Thomas)
by arrangement

230. Molecular and Cellular Immunology — For graduate students and advanced undergraduates. Basic elements 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. Prerequisites for undergraduates: Biology core or consent of instructor.

4 units, Aut (Jones) MWF 10
plus discussion by arrangement

237. Introduction to Biotechnology — (Same as Biophysics 237, Cell Biology 237, Chemical Engineering 237, Chemistry 237.) Faculty from the Departments of Biological Sciences, Cell Biology, Chemical Engineering, Chemistry, Civil Engineering, Biochemistry, Genetics, Electrical Engineering, Molecular Pharmacology, Neurobiology, and Developmental 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 and engineering.

3 units, Spr (Staff)

238H. Biomechanics of Intertidal Organisms — (Formerly 138H.) For course description, see Hopkins Marine Station section.

6 units, Sum (Denny)
alternate years, not given 1995-96


4 units (Schimke)
alternate years, given 1995-96

252. Gene Action — Student seminars on aspects of gene structure and function, and regulation of gene expression in microorganisms. Prerequisites: Biochemistry 201 or equivalent; consent of instructor.

3 units (Yanofsky)
alternate years, given 1995-96


3-4 units, Win (F. Thomas)
by arrangement

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 is analyzed and some data evaluated. Prerequisite: consent of instructor.

3 units, Aut (Feldman) by arrangement

290. Teaching of Biological Science — Open to upper division 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)
by arrangement

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 taking 290 and teaching either of the above courses. Prerequisite: selection by instructor.

2 units, Aut, Win (Staff) TTh 3:15-5:05
PRIMARILY FOR GRADUATE STUDENTS

300. Research — Individual research at the graduate level taken by arrangement with in-department or out-of-department instructors. For coterminal master’s students: credit for work with out-of-department instructors requires a departmental petition be approved.

300H. Research — For graduate research done under supervision of Hopkins Marine Station faculty.

301. Current Topics in 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)

305. Seminar in 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. Prerequisite: consent of instructor.

1-3 units, Win, Spr (Hanawalt) F 10-12

315. Seminar in Biochemical Evolution — Literature review and discussion of current topics in biochemical evolution and molecular evolutionary genetics. Prerequisite: consent of instructor.

1-3 units, Win (Watt) by arrangement

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.

3 units, Aut (Kennedy) TTh 4-6

333H. Molecular Approaches to Ion Channels — For course description, see Hopkins Marine Station section.

6 units, Sum (Gilly) by arrangement

335. Seminar in Immunobiology and Immunogenetics — Literature review of current topics in immunology. Prerequisites: introductory immunology course and (for undergraduates) consent of instructor.

1-2 units, Aut, Win, Spr (Jones) M 12:15


3 units (Green, Walbot)

alternate years, given 1995-96

342. Plant Biology Seminar — Topics announced at the beginning of each quarter. In-depth coverage of the current literature.

1 unit, Spr (Berry, Björkman, Briggs, Grossman, Hoffman, Long, Mooney, Ray, Vitousek, Walbot) T 4:15

343. Plant Molecular Biology — Review of genome structure, transposable elements, and transformation techniques of higher plants followed by in-depth analysis of current literature on plant gene expression. Lectures and discussion section.

3 units (Walbot, Hoffman, Somerville, Grossman) alternate years, given 1995-96

345. Seminar in Behavioral Ecology — (Formerly 381.) Selected topics in the evolution and ecology of social behavior; discussion of research papers. Prerequisite: consent of instructor.

1-3 units, Win (Gordon) by arrangement

346. Seminar in Genetics and Molecular Biology — (Formerly 345.) Enrollment limited to graduate students directly associated with departmental research groups in genetics or molecular biology.

1 unit, Aut, Win, Spr (Campbell, Hanawalt, Walbot, Yanofsky) M 12

349. Seminar in Population Ecology — Prerequisite: consent of instructor.

1-3 units, Aut, Win, Spr (Ehrlich) by arrangement

358. Developmental Neurobiology Seminar — For graduate students. The mechanisms of neurogenesis, migration, axon outgrowth, synapse formation, and synaptic plasticity during the development of the nervous system. Formatted entirely around student presentations of journal articles that report recent findings in the field. Prerequisites: 158/258, consent of instructor.

1 unit, Aut, Win, Spr (McConnell) F 4

360. Seminar in Cell Biology — Discussion of current literature covering any area of cell biology. Enrollment ordinarily limited to graduate students directly associated with departmental research groups; or consent of instructor.

1 unit, Aut, Win, Spr (Cyert, Kopito, Macdonald, Simon, Stearns) M 12

383. Seminar in Population Genetics — Literature review and research discussion of current problems in the theory and practice of population genetics. Student participation required. Prerequisite: consent of instructor.

1-3 units, Spr (Feldman) by arrangement
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) by arrangement

DIVISION OF MARINE BIOLOGY HOPKINS MARINE STATION

Emeriti: (Professors) Daniel Mazia, John H. Phillips, Jr., Colin S. Pittendrigh

Director: Dennis A. Powers

Professors: David Epel, Dennis A. Powers

Associate Professors: Mark W. Denny, William F. Gilly, Stuart H. Thompson

Assistant Professor: Barbara A. Block

Professor (Research): R. Paul Levine

Courtesy Professor: Irving L. Weissman

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, the Alexander Agassiz Laboratory, the Jacques Loeb Laboratory, the Harold A. Miller Library, the Monterey Boat Works, and the Walter K. Fisher Laboratory. The 15,000 volume library subscribes to approximately 450 journals, and its collections are particularly strong in marine biology, oceanography, microbiology, and embryology.

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

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, Gilly, Thompson) by arrangement

161H/261H. Invertebrate Zoology — (Graduate students register for 261H.) Introduction to the diversity of form and function in invertebrates. Local marine fauna are used in a hands-on study. Traditional systematic approach augmented by topics such as comparative skeletal mechanics, comparative neuroanatomy and physiology. Three lectures, one lab per week. Prerequisites: Biology Core or consent of instructor.

4 units, Win (Staff) by arrangement

162H/262H. Comparative Animal Physiology — (Graduate students register for 262H.) How animals work. Topics: respiration, circulation, reproduction, digestion and energy metabolism, temperature and osmotic regulation, muscle physiology and locomotion, sensory and neurophysiology. Three lectures per week. Prerequisites: Physics 21 or 51; Chemistry 31, 135; Biology Core; or consent of instructor.

4 units, Win (Block, Staff) by arrangement

163H/263H. 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; three field trips. Prerequisites: Physics 21 or 51; Chemistry 31, Biology Core; or consent of instructor.

4 units (Denny) alternate years, given 1995-96

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 (Staff) alternate years, given 1995-96

165H/265H. Air and Water — (Graduate students register for 265H.) Introduction to environmental physics. The physical properties of life's fluids compared and contrasted. How and why life has evolved differently on land than in water. Topics: density, viscosity, diffusion, thermal properties, sound, light, evaporation, and surface tension. Three lectures per week. Prerequisites: Physics 21, 23, or 51, 53; calculus; Biology Core; or consent of instructor.

3 units (Denny) given 1996-97
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. Prerequisites: Physics 21 or 51, Biology Core, or consent of instructor.

3 units, Win (Denny) by arrangement

167H/267H. Nerve, Muscle, and Synapse — (Graduate students register for 267H.) The fundamental aspects of membrane excitability and conduction, synaptic transmission, excitation–contraction coupling, and selected mechanisms of sensory transduction. Lectures/seminars. Labs on the experimental and analytical methods to study these processes, using invertebrate giant cell preparations. Three lectures per week, one lab. Prerequisites: Physics 21, 23, or 51, 53; Chemistry 31, 135; calculus; Biology Core or consent of instructor.

3 units (Gilly) given 1995-96

169H/269H. Neurobiology and Behavior — (Graduate students register for 269H). The neural mechanism responsible for generating animal behavior. Topics: neronal excitability, synaptic plasticity, signal transduction, and small neural circuits. Lectures, seminars, and journal discussions. Lab demonstrations and guided projects introduce methods used to explore neural circuits. Three lectures, one full-day lab per week. Prerequisites: Physics 21, 23, or 51, 53; Chemistry 31, 135; calculus; Biology Core; or consent of instructor.

3 units (Thompson) given 1996-97

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.

1-3 units, Win (Block, Denny, Epel, Gilly, Powers, Thompson) by arrangement

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 in biology and consent of instructors.

15 units, Spr (Block, Denny, Epel, Gilly, Levine, Powers, Thompson) by arrangement

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) by arrangement

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) by arrangement

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: Symbiosis and Parasitism — molecular biology and biochemistry of intracellular symbionts and bacterial pathogens and their hosts.


S. Thompson: Neurophysiology — neuronal control of behavior and mechanisms of ion permeation in membranes, signal transduction, calcium imaging.

Aut, Win, Spr, Sum (both terms) (Staff) by arrangement

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 of five weeks each. It is possible to register for either term, or for the full quarter. Registration is possible for only one course during each five-week session.
FIRST TERM

178H. Cell Biology of Early Development — Post-graduate level course; advanced undergraduates encouraged to apply. Five-week workshop on cellular phenomena seen during early embryonic development. Gametes of marine organisms are utilized; emphasis on experimentation and observation of living cells, including their microscopy, micromanipulation, and chemistry. 6 units (Epel) by arrangement

178H. Introduction to Oceanic Biology — The ocean as an environment: its major categories of inhabitants, producer and consumer, benthic and pelagic, invertebrate and vertebrate; and the functioning of the oceanic ecosystem. Prerequisite: introductory biology or general zoology. 6 units (Staff) by arrangement

179H. Subtidal Communities — Lectures, lab, and field trips treating shallow water marine communities. Emphasis 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 (Staff) by arrangement

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. 6 units (Denny) by arrangement alternate years, not given 1995-96

SECOND TERM

180H. Problems in Subtidal Ecology — 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. Required final paper in the form of a formal research proposal based on extensive literature review and preliminary data collected. Prerequisites: 105H or equivalent experience and knowledge; SCUBA certification, SCUBA equipment, and ocean diving experience. 6 units (Staff) by arrangement

333H. Molecular Approaches to Ion Channels — Advanced treatment of the function and regulation of ion channels and molecular-level methods of study. Daily lectures and intensive lab provide working knowledge of whole cell/single channel patch clamp, voltage clamp of oocytes in conjunction with microinjection and expression of mRNA, and biochemical analysis of channel synthesis and processing. 6 units (Gilly) by arrangement

BIOPHYSICS PROGRAM

Professors: Richard W. Aldrich (Molecular and Cellular Physiology), Robert L. Baldwin (Biochemistry), Martin J. Brown (Radiology), Gilbert Chu (Oncology), David A. Clayton (Developmental Biology), Sebastian Doniach (Applied Physics), Amato Giaccia (Radiation Oncology), John Griffin (Chemistry), Philip C. Hanawalt (Biology), Daniel Herschlag (Biochemistry), Keith O. Hodgson (Chemistry), Wray H. Huestis (Chemistry), Oleg Jardetzky (Molecular Pharmacology), Ron Kopito (Biological Sciences), Roger D. Kornberg (Cell Biology), Michael Levitt (Cell Biology), Harden M. McConnell (Chemistry), David B. McKay (Cell Biology), Robert Pecora (Chemistry), Norbert Pec (Radiology), Paul Phizackerley (SSRL), John Ross (Chemistry), Robert D. Simoni (Biological Sciences), Ed Solomon (Chemistry), James A. Spudich (Biochemistry and Developmental Biology), Lubert Stryer (Neurobiology), William Weis (Cell 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):
205. DNA Repair and Mutagenesis — (Enroll in Biology 205, Pathology 292.) 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: Biology 31, 118, and 119, or consent of instructor.

3 units, Spr (Hanawalt) alternate years, not given 1995-96

210. Advanced Topics in Membrane Biochemistry — (Enroll in Biochemistry 210.) Structure, function and biosynthesis of cellular membranes and organelles. Based on current literature, with extensive student participation. Prerequisites: Biochemistry 200, 201 or equivalents, and consent of instructor.

4 units (Pfeffer) not given 1994-95

214. Physical Biochemistry — (Enroll in Biochemistry 214.) Physical chemistry of proteins, nucleic acids, and their complexes. Topics vary and have included molecular mechanisms of proteins folding and protein–nucleic acid recognition. Current papers in the literature are discussed. Prerequisites: Biochemistry 200 and 201 (or equivalent), and a course in physical chemistry.

3 units (Baldwin) not given 1994-95

222. Signal Transduction Mechanisms — (Enroll in Cell Biology 222.) 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 cascade; 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 reconstruction 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.

3 units (Stryer)
228. Protein and Nucleic Acid Structure, Dynamics and Engineering — (Enroll in Cell Biology 228.) 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 results of experiment with theoretical molecular dynamic simulations. Enzyme catalysis is described in these terms. How 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 (Levitt)

233. Macromolecular Structure: Diffraction Methods and Diffraction Results — (Enroll in Cell Biology 232.) 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 making current literature in the field understandable to non-practitioner. Discussion of results: protein folding patterns, enzymology, receptor–effector systems, proteins of the immune system, and membrane proteins. Prerequisite: knowledge of basic biochemistry. 3 units (Levitt, McKay)

235. Structural Biology — (Enroll in Cell Biology 235.) Introduction to structural biology for graduate students in the chemical and biological sciences. Basic principles of folding patterns and structural themes found in proteins and nucleic acids. Experimental (x-ray diffraction, electron microscopy), theoretical, and computer–graphic methods used to derive and evaluate structural and dynamic information from macromolecules, emphasizing the capabilities and the limitations of the methods. Topics of current interest in protein and nucleic acid structure and function. Prerequisite: knowledge of basic biochemistry. 3 units, Win (Levitt, McKay, Weis, Kornberg)

289. Biophysical Chemistry — (Enroll in Chemistry 289.) Experimental methods in biophysics. Emphasis on spectroscopic techniques including magnetic resonance and optical methods. 3 units (Staff) not given 1994-95

291. Biophysical Chemistry — (Enroll in Chemistry 291.) Special topics in biophysical chemistry. Prerequisites: previous or concurrent registration in Chemistry 171 and 173, or equivalent. 3 units, Win (McConnell) TTh 1:15-2:30

297. Biophysical Chemistry — (Enroll in Chemistry 297.) Physical–inorganic and bio–inorganic chemistry for inorganic chemists. Introduction to metalloenzymes as unique inorganic complexes. Lingand field theory and its applications to spectroscopic and magnetic techniques. Metalloenzymes containing copper, iron, and molybdenum active sites. Background in biochemistry not necessary. Group theory and a basic understanding of quantum mechanics and molecular orbital theory is assumed. 3 units, Win (Solomon) TTh 9-11

300. Research (Staff) by arrangement

Other biophysics courses in related departments: Biochemistry 214; Cell Biology 229; Chemistry 251, 289, 291, 297; Neurobiology 216.

Other recommended courses: Biological Sciences 230, 252; Biochemistry 200, 201, 212; Cell Biology 211; Chemistry 271, 273, 275; Physics 170, 171, 230, 231, 232.

COMMITTEE ON BLACK PERFORMING ARTS

Director: Harry Elam (Drama)
Steering Committee: Elena Becks (Committee on Black Performing Arts), Earl Black (African and Afro–American Studies), Channon Dade (student), Sally Dickson (Office of Multicultural Development), Paula Ebron (Anthropology, Urban Studies), Kim Fowler (Committee on Black Performing Arts), Michelle Powles (Committee on Black Performing Arts), Jewel Hudson (ASSU Law Office), Jacqueline Jones
The Committee on Black Performing Arts 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. It functions as a (1) liaison with departments in hiring faculty and devising courses in Black performing arts; (2) producer of shows in dance, drama, and music; and (3) resource for student organizations promoting artistic expression in the Black cultural tradition. Through the cooperation of the departments, students are able to take relevant courses in dance, drama, music, and literature. While the offerings do not constitute the basis for an academic major, students are able to concentrate studies in Black performing arts as part of the A.B. major in African and Afro-American Studies.

**COURSES**

Students are advised to consult the Time Schedule each quarter to note changes.

**AFRICAN AND AFRO-AMERICAN STUDIES**

**105. Introduction to African and Afro-American Studies** — (Same as Anthropology 105.)

- DR:3(*)
  - 5 units, Win (Porter)

**DANCE**

**81. Jazz Dance I**

- 1 unit, Aut, Win, Spr (Kramer)

**182. Jazz Dance II**

- 1 unit, Aut, Win, Spr (Moses)

**183. Jazz Dance III**

- 1 unit, Win (Moses)

**185. African-Caribbean Roots of American Jazz Dance**

- 2 units, Aut (Staff)

**186. African-Caribbean Dance Techniques**

- 2 units, Spr (Staff)

**DRAMA**

**29. Theater Performance: Acting**

- 1–3 units, any quarter (Staff) by arrangement

**39A,B,C. Theater Performance: Crew**

- 1–3 units, any quarter (Staff) by arrangement

**129A. Scene Study**

- 3 units, Aut (Elam) TTh 3:15-5:15

**156. Contemporary Ethnic Drama**

- 4 units, Spr (Elam) MWF 9

**157M. El Sexto Sol: Latino/Chicano Teatro for the Next Millenium**

- 4 units, Aut (Moraga) TTh 2:15-4:05

**ENGLISH**

**93. Playwriting**

- 5 units, Spr (Smith) MW 1:15-3:05

**CHEMISTRY**


**Chair:** Robert Pecora

**Professors:** Hans C. Andersen, Steven G. Boxer, John I. Brauman, James P. Collman, Carl Djerassi, Michael D. Fayer, Keith O. Hodgson, Wray H. Huestitis, Harden M. McConnell, Robert Pecora, John Ross, Edward I. Solomon, Barry Trost, Paul A. Wender, Richard N. Zare

**Associate Professors:** Christopher E. D. Chidsey, Robert M. Waymouth

**Assistant Professors:** Dale G. Drueckhammer, John H. Griffin, T. Daniel P. Stack

**Courtesy Professors:** Michael J. Boudart, Curtis W. Frank, Alice P. Gast, Daniel Herschlag, Robert J. Madix

*The curriculum leading to the B.S. degree in Chemical Engineering is described in the “School of Engineering” section of this bulletin.

**UNDERGRADUATE PROGRAMS**

**BACHELOR OF SCIENCE**

**ENTRANCE PREPARATION**

Students intending to major in chemistry are expected to have entrance credit in the preparatory subjects of chemistry, physics, and mathematics (including algebra and plane trigonometry). Those who do not have entrance credit or equivalent training in these subjects, particularly mathematics, may experience some difficulty in meeting the department requirements for graduation in four years, especially if they expect to pursue a program leading to professional certification by the American Chemical Society or to the B.S. degree with Honors. A year or more of secondary school preparation in German is also desirable.

**MINIMUM REQUIREMENTS**

University writing and distribution requirements; Math. 19, 20, 21, 43, or Math. 41, 42, 43; Physics 51, 53, 54, 55, 56, 58, 70; Chemistry 31, 33, 35, 36, 131, 132, 133, 134, 151, 153, 171.
173, 174, 175, 176. In addition, a reading knowledge of scientific German is strongly recommended. Chemistry 133 is offered as staffing permits. In years when it is not offered, students may petition in advance to substitute other courses relevant to their programs. Students interested in attending overseas campuses should consult their advisers as early as possible to avoid scheduling problems. Note that it is particularly convenient to attend an overseas campus during Spring Quarter of the second year, since the courses listed in this quarter may be delayed to subsequent years without disadvantage. No required course may be taken on a Satisfactory/No Credit basis.

**TYPICAL SCHEDULE FOR A FOUR-YEAR PROGRAM**

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<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
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<tbody>
<tr>
<td><strong>FIRST YEAR</strong></td>
<td>A</td>
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<tr>
<td>Chem. 31. Chemical Principles</td>
<td>4</td>
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<tr>
<td>Chem. 33. Structure and Reactivity</td>
<td>4</td>
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<td>Chem. 35. Monofunctional Compounds</td>
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<td>Chem. 36. Chemical Separations</td>
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<td>Math. 41, 42, 43. Analytic Geometry and Calculus</td>
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<td>Writing and Distribution Requirements or Electives</td>
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<th><strong>SECOND YEAR</strong></th>
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<tr>
<td>Chem. 131. Polyfunctional Compounds</td>
<td>3</td>
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<td>Chem. 132. Qualitative Organic Analysis</td>
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<td>Chem. 133. Special Topics in Organic Chemistry</td>
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<td>Chem. 134. Theory and Practice of Quantitative Chemistry</td>
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<td>Chem. 136. Synthesis Laboratory (elective)</td>
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<tr>
<td>Physics 51, 53–54. Mechanics, Electricity, and Magnetism</td>
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<td>Electives (see note below)</td>
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<tr>
<td>Chem. 151, 153. Inorganic Chemistry</td>
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<td>Chem. 171, 173, 175. Physical Chemistry</td>
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<td>Chem. 174, 176. Physical Chemistry Laboratory</td>
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<td>Physics 55, 56</td>
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<td>Electives (see note below)</td>
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**Note** — Elective courses must be used to complete the University Writing, Distribution, and Language Requirements. They may also be used to broaden one’s background in science and nonscience areas and to provide an opportunity for advanced study in chemistry. Courses offered by other departments that may be of interest to chemistry majors include Biochem. 200, 201; Biol. Sci. 31, 32, 33; Chem. Engr. 20, 120, 130; Civ. Engr. 170; Comp. Sci. 106; Econ. 1; English 191; Engr. 50; Geo. & Envr. Sci. 1, 278; Math. 44, 106, 113, 130, 131, 132; Mat. Sci. & Engr. 50; Microbio. & Immun. 101; Physics 110, 111, 132; Stat. 40, 110, 116.

**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 letter grade indicator (LGI) of at least ‘B’ 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 from Chemistry 221, 223, 225, 227, 251, 253, 255, 271, 273, 275; Biochemistry 200, 201; Math. 130, 131, 132; Physics lecture courses numbered 100 or higher; Geological and Environmental Sciences 278; or other advanced courses approved by the student’s adviser and by the supervisor of his or her work in Chemistry 190. An overall LGI of 3.3 in mathematics, physics, and chemistry is required for a degree with honors.

Students who wish to be admitted to the honors program should register in the department undergraduate office 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. Students who do not complete the requirements for an advanced degree within six years after entrance as a graduate student must repeat and pass the qualifying examinations and must meet any other requirements established by the faculty before the degree is granted.

Candidates for advanced degrees must have a minimum letter grade indicator (LGI) 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 “Advanced 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 physical chemistry, biophysical 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 24, 25, and 26, 1994, 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, or 275.

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 1994-95.

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 1994-95* 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 (e.g., physics, mathematics, electrical engineering, biochemistry, pharmacology, 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.

**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 an LGI 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**

*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**

*30. Introduction to Chemistry* — Preparation for Chemistry 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 (Andersen) MWF 10

*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. Prerequisite: high school algebra. Recommended: high school chemistry and physics. DR:5(7)

4 units, Aut (Chidsey, Stack)

sec 1 MWF 9 W 7 p.m.

sec 2 MWF 11 W 7 p.m.

Win (Boxer) MWF Win one recitation by arrangement

*32. The Frontiers of Chemical Science* — For students with AP Chemistry scores of 4 or 5 who wish to develop a deeper understanding. Intended to complement a previous rigorous introduction to chemistry; encompasses structure and reactivity, cuts across the traditional subdivisions of chemistry. Recent advances in structures, analytical methodologies, catalysis, redox phenomena, organometallic, and bio-inorganic chemistry. DR:5(7)

5 units, Aut (Collman, Zare) MWF 10

one lab by arrangement

*33. Structure and Reactivity* — Organic chemistry, functional groups, hydrocarbons, stereochemistry, thermochemistry, kinetics, chemical equilib-
ria. Prerequisite: 31, 32, or an AP Chemistry score of 4 or 5. DR:5(7)
4 units, Win (Kluge, Trost)
sec (1) MWF 9; sec (2) MWF 11
Spr (Wender) MWF 1:15
one recitation by arrangement

*35. Organic Monofunctional Compounds — Organic chemistry of oxygen, nitrogen aliphatic and aromatic compounds. Prerequisite: 33.
4 units, Aut (Waymouth) MWF 1:15
Spr (Huestis, Drueckhammer) W7 p.m.
sec 1 MWF 9; sec 2 MWF 11
one recitation by arrangement

*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 (Hodgson) lec T 1:15
lab T 2:15-6:05 or MWTh or F 1:15-5:05

100L. Laser Methods in Chemistry — For sophomores only. Basic principles of the laser. How laser light differs from other light sources and how lasers can be controlled. Application of lasers to measurement of molecular structure, reaction dynamics, and quantification. Prerequisite: 31 or 32.
3 units, Aut (Zare) T 2-5

*130. Theory and Practice of Identification — For students in biomedical sciences; Chemistry majors take 132. Lectures on theory and interpretation of ultraviolet, infrared, nuclear magnetic resonance, and mass spectral data. Lab involves identification of unknowns and components of a mixture using derivatives and spectra. Prerequisites: 35, 36, and concurrent registration in 131.
4 units, Aut (Drueckhammer)
lec TTh 9, lab MWTh or F 1:15-5:05

131. Organic Polyfunctional Compounds — Aromatic compounds, polysaccharides, amino acids, proteins, natural products, dyes, purines, pyrimidines, nucleic acids and polymers. Prerequisite: 35.
3 units, Aut (Huestis) TTh 11-12:15
Win (Griffin) TTh 11-12:15

*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. Prerequisites: 35, 36, and concurrent registration in 131.
5 units, Aut (Drueckhammer) lec TTh 8, lab MW 1:15-5:05 or TTh 1:15-5:05

3 units, Win (Staff) MWF 11

5 units, Win (Stack) TTh 8:30-9:50
lab W 2:35-6:05, F 1:15-4:05,
or T or Th 1:15-4:05

*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 (Ross) TTh 11-12:15

*136. Synthesis Laboratory — Advanced synthetic methods in organic and inorganic laboratory chemistry. Prerequisites: 130 or 132, 131.
3 units, Spr (Flippin) MW or TTh 1:15-5

151. 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 on the chemistry of the metallic elements. Prerequisites: 35, 171.
3 units, Win (Collman) MWF 1:15-2:30

153. 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 (Solomon) MW 1:15-2:30

171. Physical Chemistry — Chemical thermodynamics; fundamental principles, Gibbsonian equations, equilibrium conditions, phase rule, systematic deduction of equations, gases, solutions. Prerequisites: 35; Math. 19, 20, 21 (or equivalent); Physics 51, 53, 54; and previous or concurrent registration in Physics 55.
3 units, Aut (Pecora) MWF 11

173. 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 (Payer) MWF 11
CHEMISTRY 367

174. Physical Chemistry Laboratory — Lectures/lab introduce electronics, electrochemistry, optics, rotation–vibration spectroscopy, and electronic spectroscopy. Lectures, lab tours on experimental techniques used in research projects at Stanford. Prerequisites: 171, previous or concurrent enrollment in 173.
4 units, Win (Chidsey) TTh 10–11:15
lab MTWTh or F 2:35–5:25

3 units, Spr (Ross) MWF 11–12:15

176. Physical Chemistry Laboratory — Use of chemical instrumentation to study fundamental areas of physical chemical time–dependent processes. Experiments include gas-phase kinetics, fluorimetry, and nuclear magnetic resonance spectroscopy. Prerequisites: 173, 174, previous or concurrent enrollment in 175.
3 units, Spr (Boxer) TTh 9
lab T or W 1:15–4:05

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 (Griffin) TTh 9–10:30

223. Advanced Organic Chemistry — Continuation of 221 with emphasis on physical methods. Prerequisite: 221 or consent of instructor.
3 units, Win (Trost) WF 2:15–3:45

225. Advanced Organic Chemistry — Continuation of 223. Organic reactions, new synthetic methods, conformational analysis, and exercises in the syntheses of complex molecules. Prerequisite: 223 or consent of instructor.
3 units, Spr (Wender) TTh 9–11

227. Selected Topics in Organic Chemistry — (Same as 221.) 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. Prerequisite: 225 or consent of instructor.
3 units, Aut (Griffin) TTh 9–10:30

229. Organic Chemistry Seminar — Attendance required of all graduate students majoring in organic chemistry.
1 unit, Aut, Win Spr (Brauman) W 4

233. 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) by arrangement

237. Introduction to Biotechnology — (Same as Biology 237, Biophysics 237, Cell Biology 237, Chemical Engineering 237.) Faculty from the Departments of Biological Sciences, Cell Biology, Chemical Engineering, Chemistry, 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 biochemolecules. Prerequisite: graduate student or upper–division undergraduate in the sciences and engineering.
3 units, Spr (Staff)

251. Selected Topics in Advanced Inorganic Chemistry — May be repeated for credit. Prerequisites: one year of physical chemistry, consent of instructor.
3 units, Aut, Win, Spr (Staff) TTh 11

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, Win (Solomon) TTh 9–11

3 units, Win (Waymouth)

257. Research Proposals in Inorganic Chemistry — Required of all second–year students in inorganic chemistry. Research progress reports (Autumn) and research proposals (Winter and Spring)
are presented in oral and written form. Writing ability, oral defense, and scientific content is critized.

1 unit, Aut, Win, Spr (Staff) by arrangement

259. Inorganic Chemistry Seminar — Attendance required of all graduate students majoring in inorganic chemistry.

1 unit, Aut, Win Spr (Staff) T 4

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) TTh 11-12:15

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 (Shafer-ray) TTh 1:15-2:30

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 (Andersen) TTh 11-12:15

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) not given 1994-95

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 is evaluated.

1 unit, Aut, Win, Spr (Staff) by arrangement

287. Biophysical Chemistry — 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 1994-95

289. Biophysical Chemistry — Experimental methods in biophysics. Emphasis on spectroscopic techniques including magnetic resonance and optical methods. Prerequisite: 287.

3 units (Staff) not given 1994-95

291. Biophysical Chemistry — Special topics in biophysical chemistry. Prerequisites: previous or concurrent registration in 171 and 173, or the equivalent.

3 units, Win (McConnell) TTh 1:15-2:30

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 1994-95

297. Biophysical Chemistry — (Same as 253.) Physical-inorganic and bio-inorganic chemistry for inorganic chemists. Introduction to metalloenzymes as unique inorganic complexes. Ligand field theory and its applications to spectroscopic and magnetic techniques. Metalloenzymes containing copper, iron, and molybdenum active sites. Background in biophysics not necessary. Group theory and a basic understanding of quantum mechanics and molecular orbital theory is assumed.

3 units, Win (Solomon) TTh 9-11

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) by arrangement

300. Department Seminar — Required of all graduate students, and all undergraduates registered for 190.

1 unit, Aut, Win, Spr (Staff) Th 4

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
A visiting scholar has been appointed to teach two courses of special interest to students wishing to develop a scholarly understanding of the nation's second largest ethnic group, an ethnic group that by the year 2030 is expected to become the largest in California.

The program's annual offerings supplement and complement a small selection of outstanding courses on diverse aspects of Mexican society and culture in the United States, taught by regular members of the Stanford faculty.

COURSES

The 1994-95 Chicano/a Fellows Courses pamphlet may be obtained from the Program Administrator, Chicano/a Fellows Program, Bldg. 590, room L (El Centro); telephone 415-723-3091.

110. Introduction to Chicano Life and Culture — (Religious Studies 143, Spanish 180.) Interdisciplinary examination of the history and culture of Mexicans in the United States. Special emphasis on literature and religious studies. DR:3

5 units, Aut (Yarbro-Bejarano, Busto)

157. El Sexto Sol: Latino/Chicano Teatro for the Next Millennium — (Enroll in Drama 157M.) Writing for Performance course. Students develop their own original material to be performed by class members. Through playwriting and acting exercises, including dramatic monologue and scenework, docu-drama, agit-prop, teatropoesia, and oral histories, students help create new Latino theater for the 21st century.

4 units, Aut (Moraga) TTh 2:15-4:05

164. Introduction to Race and Ethnicity in the American Experience — (Same as American Studies 164, History 164.) How race and ethnicity have influenced the American experience over time. Social sciences, pseudo-scientific, and historical literature expose students to the ideas and issues which shaped racial ideologies and affected shifting American attitudes about American Indians, Blacks, Hispanics, and Asian Americans. Focuses on the past two centuries. DR:3

5 units, Spr (Gutierrez, Fredrickson) MTWTh 11-12:15

198. Modern Chicano/a Fiction — (Same as Comparative Literature 196, Spanish 186.) Readings of novels and short fiction by Rudolfo Anaya, Ana Castillo, Denise Chávez, Sandra Cisneros, Roberta Fernández, Arturo Islas, and Tomás Rivera. The evolution of Chicano/a literature; aspects of the Chicano/a historical and literary experience; themes such as the search for identity, mestizaje, problems of language use and choice, invisibility, silence, blindness, and gender as it relates to issues of
ethnicity and class. Students add their own observations and discoveries.

4-5 units, Win (Espinosa)

268. Undergraduate Colloquium: Immigration and Ethnicity in Modern American History — (Enroll in History 268.) Issues of race, human migration, and ethnicity are provocative areas of historical research today. Readings/discussion on recent literature and interpretations on the last 100 years of American history. Comparative critical perspective explores the complex issues involved in the migration process. The various competing theories explaining the dynamics of immigrant-native interaction (assimilation, pluralism, ethnogenesis, and transnationalism), citizenship, and the persistence (or lack thereof) of ethnic attachments among different groups in American society.

4 units, Spr (Sandoval)

285. Chicana Expressive Culture — (Same as Spanish 285.) Analysis of the expressive culture (visual art, film/video, writings and everyday cultural practice) of Mexican women in the U.S., viewing culture as fluid and dynamic, and shaped by the historical experience of its practitioners. Historical survey of culture as a site of conflict, contradiction, domination/resistance, and protest. In English.

3-5 units, Spr (Yarbro-Bejarano)

286. Chicano Theater — (Same as Spanish 286.) Examines 19th- and early 20th-century antecedents to Chicano theater. El Teatro Campesino, El Teatro de la Esperanza and other U.S. and Latin-American political theater groups/movements which influenced Chicano theater and were in turn shaped by Chicano theatrical paracticees, (the SF Mime Troupe, Augusto Boal, Enrique Buenaventura) and Mexican groups (Teatro Zero). The emergence of women's and gay and lesbian voices, beginning with the history of the Women's Caucus within the national Chicano theater organization TENAZ, early teatropoesia works (Tongues of Fire), and Edgar Poma's coming-out drama The Reunion. Chicanas/Latina playwrights, (Scott, Moraga, Lopez.)

3 units, Win (Yarbro-Bejarano)

SPANISH

11B, 12B, 13B. Second-Year Spanish for Bilingual Students — (Same as Spanish 11B, 12B, 13B.) Series for bilingual students who wish to refine command of the language and to enlarge vocabulary. Short readings by and about Chicanos and other Latinos in the U.S. Slides, tapes, videos, and films.

4 units, Aut, Win, Spr (Sandoval) MTWTh

132B. Mexican and Chicano Cultural Perspectives — (Same as Spanish 132B.) For non-majors, bilingual students, and others interested in the culture of Spanish speakers. Art, current events, folklore, history, language, and literature. Lectures supplemented by slides, movies, tapes, and occasional field trips.

3 units, Win (Yarbro-Bejarano)

CHILDREN AND SOCIETY CURRICULUM

Affiliated Faculty: Sanford M. Dornbusch, Director (Sociology, Human Biology, Education); Christina Johannes, Assistant Director; John Baugh (Education), Michael J. Boskin (Economics, Hoover Institution), Robert C. Calfee (Economics) Roland Claranello (Psychiatry and Behavioral Sciences), Elizabeth G. Cohen, (Education, Sociology), Harvey J. Cohen (Pediatrics), Lee J. Cronbach (Education, emeritus), Phyllis Denney, (Pediatrics), S. Shirley Feldman (Psychiatry, Human Biology), Anne Fernald (Psychology), Victor R. Fuchs (Economics, Health Research and Policy), Shirley B. Heath (English, Linguistics), Janet R. Johnston (Sociology), Donald Kennedy (Biological Sciences), Michael W. Kirst (Education), Eleanor E. Maccoby (Psychology, emerita), Ellen Markman (Psychology, Milbrey W. McLaughlin (Education), Fernando S. Mendola (Pediatrics), Susan Nolen-Hoeksema (Psychology), Roger G. Noll (Economics, Public Policy), Amado M. Padilla (Education), Donald F. Roberts (Communication), Timothy K. Stanton (Haas Center for Public Service, Public Policy), Claude M. Steele (Psychology), James Steyer (Education), Myra H. Strober (Education), David B. Tyack (Education, History), Arthur P. Wolf (Anthropology)

The curriculum on Children and Society is based at the Stanford Center for the Study of Families, Children and Youth, an interdisciplinary research center. The curriculum represents the center's commitment to undergraduate education.

The School of Education collaborates with the curriculum on behalf of those undergraduates who wish to build into their studies a concentration on education and children. Students with a concentration in education are encouraged to take
Education 144X to fulfill the curriculum's research requirement.

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, Human Biology, Political Science, Psychology, Public Policy, or Sociology. Students who fulfill the Children and Society curriculum's requirements receive a certificate, authorized by the academic senate, upon graduation. These requirements are:

1. Sociology 155
2. One of six policy courses: Education 105, 141, or 323A; Political Science 187; or Public Policy 50 or 182
3. A research experience to be met in one of four ways:
   a) a data interpretation and evaluation course: Education 144X
   b) individual research work supervised by a faculty member,
   c) an honors thesis, or
   d) a group research project
4. A policy-related internship

Interested students should contact the curriculum at 415-725-2518.

The annual Matt M. Goldstein Prize of $500 is awarded to one student or jointly to two students writing the best paper on a topic related to children at risk. All Stanford students are eligible. Submit papers to the Director, Stanford Center for the Study of Families, Children and Youth.

COURSES

EDUCATION

105. American Education and Public Policy — (Same as History 158B, Political Science 186K.) 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.

   3 units, Aut (Kirst, Tyack) MW 2:15 and by arrangement

141. Children, Civil Rights, and Public Policy in the U.S. — 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.

   5 units, Spr (Steyer) WThF 11-12:30

144X. Understanding Research on Children and Schools — Citizens concerned with children’s well-being depend on several sources to gauge the effectiveness of various policy options: media, government analyses, scholarly reports, etc. Is student achievement declining, staying steady, or improving? Does Head Start help? Can standardized tests be trusted? The concepts and skills guiding research children and schools across a range of problems, conceptualizations, methods, and interpretations. Problem-based, covering quantitative and qualitative methods.

   5 units, Win (Calfee) MW 3:15-5

323A. Federal and State Policy: Education and Children — The formulation and improvement of federal and state education and children policy. Key current policy issues and trends in past policies. Prerequisite: senior honors, coterminal, or APA student, or consent of instructor. (APA)

   3 units, Spr (Kirst) MW 9-10:30 and by arrangement

POLITICAL SCIENCE

187. Introduction to the Politics of Educational Analysis — (Same as Education 220B.) 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.

   4 units, Win, Sum (Kirst)

PUBLIC POLICY

50. Current Trends in Policy Making — Guest speakers address current policy issues (the environment, health care, education, and the budget). Discussions about these policies, stressing interactive learning that puts the students in the positions of the policy makers.

   3 units, Spr (Brady, Cogan, Noll)
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)

SOCILOGY


5 units, Win (Dornbusch) TTh 9-10:50

AFFILIATED DEPARTMENT OFFERINGS

The following courses are related to children and public policy. They do not count toward curriculum certification.

ANTHROPOLOGY

114. Introduction to Chinese Society
(Wolf)

170A. Language and Culture of Urban Youth — (Same as Linguistics 159.)
(Heath)

COMMUNICATION

170. Communication and Children
(Roberts)

171. Communication and Children II: Research Practicum
(Roberts)

ECONOMICS

118. Economics of Development

147. Economics of Human Resources
(Royalty)

150. Economics of Public Policy — (Same as Public Policy 104.)
(Noll)

156. Economics of Health and Medical Care
(Phibbs)

EDUCATION

110X. Urban Youth and Their Institutions: Research and Practice
Heath, McLaughlin

201. History of Education in the United States — (Same as History 158.)
(Tyack)

210. Problems in Sociology of Education
(Cohen)

220A. The Social Sciences and Educational Analysis: Introduction to the Economics of Education
(Levin)

HISTORY

158. History of Education in the United States
(Tyack)

HUMAN BIOLOGY

3B. The Human Life Cycle
(Feldman, Katchadourian)

171. Adolescence
(Feldman)

PSYCHOLOGY

111. Developmental Psychology
(Flavell)

115. Social Development
(M. Lepper)

120. Cognitive Development
(Markman)

130. Development in Infancy
(A. Fernald)

SOCIOLOGY

130. Education and Society
(Meyer)

150. The Family
(Herting)

186. Urban Politics
(Fraga)

POLITICAL SCIENCE

122. Social Processes and Pathological Outcomes
(Johnston)
CLASSICS

Chair: Susan A. Stephens
Professors: Andrew M. Devine, Wilbur Knorr (Classics, Philosophy, and History and Philosophy of Science), Marsh H. McCall, Jr., Susan A. Stephens, Susan Treggiari (Classics and, by courtesy, History)
Associate Professors: Jody Maxmin (Art History and Classics), Michael Wigodsky
Assistant Professors: W. Martin Bloomer, Andrea Wilson Nightingale
Professor (Teaching): Robert C. Gregg (Religious Studies)
Courtesy Professors: George Brown (English), C. Julius Moravcsik (Philosophy)
Assistant Professor (Teaching): Maurice Rehm
Lecturers: Maud Gleason, Patrick Hunt, Steven Johnstone, Lisa Maurizio
Visiting Associate Professor: Daniel Selden
Webster Visiting Professor: Oliver Taplin
Undergraduate Director: Andrea Nightingale

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; 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: literature in translation, philosophy, ancient history, religion and mythology, art, and archaeology. 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 extent required by options 2 and 3. It is not suitable 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 philosophy/religion. 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 of the 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, all at the 100 level or higher. 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 letter grade indicator (LGI) lower than 'C' is counted toward fulfilling major requirements.

**HONORS PROGRAMS**

A minimum LGI 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 will cover (that is, course work in literature, history, philosophy, art, Greek, and/or Latin language, and so on). If the proposal is approved, the student may sign up for Greek, Latin, or 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 an LGI 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 Committee, 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 Stanford University for about 50 constituent colleges and universities. It is open to Stanford majors in the Department of Classics, Department of 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 175-205 sequence in at least one language (Latin or Greek).

5. Writing a thesis or passing an examination on a particular author or topic, or submitting written work accepted by the graduate committee as an equivalent.

6. Reading knowledge of French or German.

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 “Advanced 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 12 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 sat-
isfy 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.

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 language 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
GREEK

INTRODUCTORY

Those who have not studied Greek may begin with either Greek 1 or Greek 51. The series 1, 2, 3 begins in Autumn Quarter (5 units a quarter); the series 51, 52 begins in Winter Quarter (6 units a quarter) and is intended to cover the same ground as 1, 2, 3 at a more rapid pace. Greek 55, which covers the theoretical aspects of learning a classical language, is recommended as a supplement to Greek 2 or 51.

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, 10, and 52. 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 (Chapman) MWF 9
2. First-Year Greek — Continuation of 1. 5 units, Win (Chapman) MWF 9
3. First-Year Greek — Continuation of 2. 5 units, Spr (Chapman) MWF 9
10. Intensive First-Year Greek — Intensive beginning Greek equivalent to 1, 2, 3, or 51, 52. The goal is the reading of easy classical or New Testa-
ment Greek by the end of the Summer Quarter. Short readings in philosophical Greek are included. 8–9 units, Sum (Staff) MTWThF

51. First-Year Greek — Accelerated.
6 units, Win (Maurizio) MTWThF 1:15

52. First-Year Greek — Accelerated; continuation of 51.
6 units, Spr (Maurizio) MTWThF 1:15

INTERMEDIATE/ADVANCED

Students are admitted to these courses by completing Greek 3, 10, or 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 175 and 202 or 203.

101. Second-Year Greek — Plato, one short dialogue and selections.
5 units, Aut (Knorr) MWF 1:15

102. Second-Year Greek — Greek Tragedy, one play.
5 units, Win (Cohen) MWF

103. Second-Year Greek — Homer, selected books from the Odyssey.
5 units, Spr (Hunt) MWF

111. Greek Prose: Aristotle Poetics
5 units, Aut (Nightingale) TTh 11-12:15

160. Individual Work — For department majors only.
by arrangement

UNDERGRADUATE AND GRADUATE

175A,B. Greek Style and Syntax — For undergraduates who have taken a minimum of three years of Greek and 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.
4 units, Aut (Stephens) TTh 1:15
2 units, Win (Stephens) TTh

202–203A,B,C. Survey of Greek and Latin Literature — The following form a two-year required 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 as well as prose; organization is generic. Non- Classics majors may take one or more quarters without the language component.

202A. Epic
5 units, Aut (Edwards, Wigodsky) TTh 2:15-4:05

202B. Philosophy and Rhetoric
5 units, Win (Nightingale, Wigodsky) TTh

202C. Greek Tragedy
5 units, Spr (McCall) TTh

203A. Comedy and Satire
given 1995–96

203B. History
given 1995–96

203C. Lyric, Bucolic, and Didactic
given 1995–96

205A,B. The Semantics of Grammar — Supplements Latin and Greek 175, 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) F 2:15
1 unit, Win (Devine) F

260. Directed Reading
by arrangement

360. Dissertation Research
1–15 units, any quarter (Staff)
by arrangement

370. Greek Pros or Verse Composition
by arrangement

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, 52 begins in Winter Quarter (6 units a quarter) and is designed to cover the same ground as 1, 2, 3, at a more rapid pace. Latin 55, which covers theoretical aspects of learning a classical language, is recommended as a supplement to Latin 2 or 51.

The intensive Latin course (Latin 10) offered in the Summer Quarter also prepares students to enter Latin 101 in Autumn Quarter.

The series 101, 102, 103 forms a sequel to Latin 3, 10 and 52. 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 Latin
should consult their department’s advisers to
determine the precise nature of those requirements. Most departments are satisfied if part of the series 101, 102, 103 is completed.

Courses in Latin have department prefix 375.

1. First-Year Latin — For beginners.
5 units, Aut (Clayton) MWF 9

2. First-Year Latin — Continuation of 1.
5 units, Win (Imber) MWF 9

3. First-Year Latin — Continuation of 2.
5 units, Spr (Hunt) MWF 9

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 Summer Quarter.
8-9 units, Sum (Staff) MTWThF

51. First-Year Latin — Accelerated.
6 units, Win (Devine) MTWThF 1:15

52. First-Year Latin — Accelerated; continuation of 51.
6 units, Spr (Devine) MTWThF 1:15

INTERMEDIATE/ADVANCED

Students are admitted to these courses by completing Latin 3, 10, or 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 (Treggiari) MWF 2:15

5 units, Win (Hunt) MWF

103. Second-Year Latin — Selections from Vergil, Aeneid, selected books.
5 units, Spr (McLaren) MWF

111. Gender and Genre in Roman Poetry
4 units, Aut (Maurizio) MW 11-12:15

160. Individual Work — For department majors only.
by arrangement

199. Undergraduate Thesis
by arrangement

UNDERGRADUATE AND GRADUATE

175A, B. Latin Style and Syntax — Designed for undergraduates who have taken a minimum of three years of Latin and 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) MW 1:15
2 units, Win (Devine) TTh


202A. Epic
5 units, Aut (Edwards, Wigodsky) TTh 2:15-4:05

202B. Philosophy and Rhetoric
5 units, Win (Nightingale, Wigodsky) TTh

202C. Greek Tragedy
5 units, Spr (McCall) TTh

203A. Comedy and Satire
given 1995–96

203B. History
given 1995–96

203C. Lyric, Bucolic, and Didactic
given 1995–96

204. Introduction to Modern Classical Scholarship — Positions the discipline of Classics in a historical and a modern critical context, introducing the major trends in post-modern criticism and their significance for classical studies. Begins critical writing in graduate work.
4 units Aut. (Johnstone) MW

205A, B. The Semantics of Grammar — See Classics/Greek 205 A, B.
2 units, Aut (Devine) F 2:15
1 unit, Win (Devine) F 1:15

260. Directed Reading
1-15 units, by arrangement

360. Dissertation Research
1-15 units, any quarter (Staff) by arrangement

370. Latin Prose or Verse Composition
by arrangement

Some of the above courses may be continued on 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

GENERAL

These courses have department prefix 378.

11. The Concept of the Hero — DR:7(2)
3-5 units, not given 1994-95
11A. Reading Tutorial in Epic — In Greek or Latin.  
3-4 units

12. Greek Tragedy — (Same as Drama 53.) DR:7(2)  
3-5 units, Win (McCall)

12A. Reading Tutorial in Tragedy — In Greek.  
3-4 units, Win (Staff)

18. Greek Mythology — DR:8(3)  
3-4 units, Spr (Maurizio)

18A. Reading Tutorial in Mythology — In Greek.  
3-4 units, Spr (Staff)

107. Conversion and Identity: Ancient Practice and Modern Theory — (Same as Religious Studies 107.) The dynamics of religious and philosophical conversion, as seen in Greek, Roman, Jewish, and early Christian literary sources, involve aspects of change that are personal, cultural, and social. Ancient narrators’ accounts of their (or others’) conversions, read on their own terms and in the light of studies of the phenomenon of “turning-to” a new faith, philosophy, or ideology, recently produced and drawing from history, religion, theology, sociology, anthropology, psychology.  
5 units, Spr (Gregg, Gleason)

165. Hellenistic Philosophy  
4 units, Aut (Wigodsky) MWF 10

169. Greek Ethical Philosophy: Socrates, Plato, Aristotle — DR:8(3)  
3-5 units, Win (Nightingale)

169A. Reading Tutorial in Philosophy — In Greek.  
3-4 units, Spr (Staff)

176. Majors Seminar: Interpreting Antiquity — Required for all Classics majors. Introduction to basic theoretical issues in classical literature, history, and philosophy. Evolution and coherence of the discipline of Classics, and the various ways in which antiquity was/is appropriated by post-classical cultures. Writing intensive course.  
3-5 units, given 1995-96

199. Undergraduate Thesis — Up to 6 units per quarter, not to exceed 10 units total.

201. Introduction to Classical Scholarship  
1 unit, Spr (Wigodsky)

CLASSICS/HISTORY  
These courses have department prefix 371.

101. History of Ancient Greece: Society and Politics from Homer to Alexander — DR:9(5)  
4-5 units, Aut (Johnstone) MWF 10

101A. Reading Tutorial in History — In Greek.  
3-4 units, Aut (Staff)

102. Roman History I: The Republic — DR:9(5)  
4-5 units, Win (Treggiari) MWF

102A. Reading Tutorial in History — In Latin.  
3-4 units, Win (Staff)

103. Roman History II: The Empire — DR:9(5)  
4-5 units, Spr (Treggiari) MWF

103A. Reading Tutorial in History — In Latin.  
3-4 units, Spr (Staff)

104. Early Christianity — DR:8(3)  
5 units, Win (Gregg) TTh

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 has prevailed in the West from time of the Renaissance. DR:2 and 9(5*)  
3-4 units, Spr (Stephens)

108. Pagans and Christians — DR:8(3)  
4-5 units, not given 1994–95

108A. Reading Tutorial in Late Antiquity — In Greek or Latin.  
3-4 units, Aut (Staff)

120. Athenian Social History — DR:9(5)  
4-5 units, not given 1994–95

125. Ancient Politics — DR:9(5)  
3-4 units, Aut (Johnstone) TTh 1:15

179. Cicero, A New Man in Politics and the Courts  
5 units, Aut (Treggiari) M 3:15-5:05

CLASSICS, ART/ARCHAEOLOGY  
Courses in Classical Art and Archaeology have department prefix 372.  
See also Art 100A,B.

14. Classical Athletics — DR:9(5)  
not given 1994–95

20. Introduction to Classical Archaeology — DR:9(5)  
4 units, Aut (Hunt) TTh 2:15-3:45

25. The Archaeology of the Greeks  
not given 1994–95

100A. Archaic Greek Art — DR:7(2)  
4 units, Aut (Maxmin) MWF 11-12:15

100B. Classical and Hellenistic Art — DR:7(2)  
4 units, Win (Maxmin) MW

100C. Ancient Art III: Roman Art  
4 units, Spr (Maxmin) MWF

102. Greek Painting  
not given 1994–95

108. Topography and Monuments of Greece  
not given 1994–95

120. Greek Painting  
not given 1994–95
120A. Greek Art (Undergraduate Colloquium) —
(Same as Art 202A.)
4 units, Aut (Maxmin) MW 1-2:30

HISTORY OF SCIENCE
The Department of Classics participates in the
History and Philosophy of Science Program, de-
scribed in that program’s section of this bulle-
tin.
Courses in History of Science have department
prefix 378.
138A,B,C. Introduction to Cosmology — (Same
as History 138A,B,C; History and Philosophy
of Science 138A,B,C; Philosophy 138A,B,C.)
Three-quarter sequence on the history of the exact
sciences, emphasizing cosmology. Technical aspects
of the classical theories (Ptolemaic and Coperni-
can), including mathematics, astronomy, physics,
and chemical theory, together with speculative as-
pects in natural philosophy and theology.
138A. Ancient Period — DR:8(3)
4 units, Aut (Knorr) MWF 2:15
138B. Cosmology: Middle Ages and Renais-
sance — DR:8(3)
4 units, Win (Knorr) MWF 2:15
138C. Modern Period: Newton to Einstein —
DR:8(3)
4 units, Spr (Knorr) MWF 2:15

140. History of Mathematics
4 units, Win (Knorr)

GRADUATE SEMINARS
Graduate seminars vary each year. The fol-
owing are given this year.

ANCIENT HISTORY (371)
328. Love and Honor: Attitudes, Morality, and
Behavior in the Time of Cicero
5 units, Win (Treggiari) T

331. Greek History
5 units, Spr

CLASSICS, GENERAL (378)
407. Alexandrian Poetry
5 units, Win (Stephens)
442. Hellenistic Theories of Literature and Lan-
guage
3 units, Win (Wigodsky)
443. Social History of Ancient Rhetoric
5 units, Spr (Bloomer) W

GREEK (373)
431. Homer Hymns
5 units, Aut (Edwards) W

LATIN (375)
401. Vergil: Aeneid
5 units (Selden) Th 2:15-4:05

COMMUNICATION
Emeriti: (Professors) Elie Abel, Richard A. Brody,
Lyle M. Nelson, William Rivers; (Professor
Teaching) Ronald Alexander; (Adjunct Pro-
fessor) Julian Blaustein
Chair: Donald F. Roberts
Director, Institute for Communication Research:
Byron B. Reeves
Director, John S. Knight Fellowships for Pro-
fessional Journalists: James V. Risser
Director, Journalism: Theodore L. Glasser
Director, Film and Video: Henry S. Breitrose
Director, Media Studies: Steven H. Chaffee
Professors: Henry S. Breitrose, Steven H. Chaffee,
Byron B. Reeves, Donald F. Roberts
Associate Professors: Theodore L. Glasser,
Clifford I. Nass
Assistant Professor: June Flora
Professors (Teaching): Jan Krawitz, Marion
Lewenstein, James V. Risser, Kristine
Samuelson
Lecturers: James R. Bettinger, Dale Maharidge
Consulting Professor: Jon Else

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 or other
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
nondegree program. Twelve U.S. journalists are
joined by six International Fellows sponsored by
Reuter Foundation, the Knight Foundation, and
others.

ADMISSION
Prospective Undergraduate Students — Write
to the University’s Office of Undergraduate Ad-
misions, Stanford University, Stanford, Califor-
nia 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 quantita-
tive scores from the Graduate Record Examina-
tion (GRE).
UNDERGRADUATE PROGRAM
BACHELOR OF ARTS

The undergraduate curriculum is intended for liberal arts students who wish to build a fundamental knowledge of communication in society. Majors take courses from three different communication orientations within the Department of Communication, plus a selection of elective courses. In addition, undergraduates take one class in statistics. The two-course Area I requirement considers the roles and interaction of institutions such as broadcasting, film, journalism, constitutional law, and business within communication and mass communication contexts. The two-course Area II requirements provide an experiential approach in which students take practicum courses such as news writing and reporting, broadcasting, and film and video. Area III is a three-course requirement in which the emphasis is on the ways communication scholars conduct research in, and consider the issues of, human communication.

Both theory and practicum courses are included in media and society, print and broadcast journalism, visual communication (film/video), and communication research. Through electives, including an optional senior project or honors thesis, a student may build greater depth in any of these areas.

To be recommended for the A.B. degree in Communication, students must complete at least 50 units (preferably not more than 60 units) within the department, plus statistics, which can be taken for +/-No Credit (+/-NC). No more than 12 units of transfer credit or Summer Session credit may be applied to meet department requirements. Communication majors must register for a letter grade for all communication courses unless offered only for Satisfactory/No Credit (S/NC).

CURRICULUM

1. Students should declare the major during either the sophomore or junior year. To declare, a student should have completed or be enrolled in the following courses:
   a) Communication 1, Mass Communication and Society
   b) Psychology 60, Statistics 60, or Statistics 70

2. Majors must take courses in the following three areas as specified below:
   a) Area I — minimum of two courses from: 101, 110, 122A, 125, 131, 139, 140, 141, 142, 176, 178
   b) Area II — minimum of two courses from: 104, 114, 136, 150, 175, 177, 180

Some courses are not given every year. Refer to course listings and Time Schedules each quarter, noting individual course prerequisites in this bulletin.

HONORS PROGRAM

The honors program provides the opportunity to undertake a significant program of research. It represents the department's commitment to and recognition of the value of research and of the individual professor/student mentoring relationship in undergraduate education. Working in a one-on-one mentor relationship with a faculty adviser, seniors may earn up to 15 communication units culminating in an honors thesis. Interested majors should apply to the program late in their junior year.

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 a coterminal program with an A.M. emphasis in Media Studies; see Lola Romero, Student Services Administrator, for more information.

GRADUATE PROGRAMS

MASTER OF ARTS

The department awards terminal A.M. degrees in three fields: Media Studies, Journalism, and Documentary Film and Video Production. Students interested in doctoral work are evaluated for admission on different criteria. Students who complete the A.M. degree and who desire entry into the Ph.D. program must file a new application for admission and are considered together with 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.

MEDIA STUDIES

The Media Studies master's program (formerly called Applied Communication Research) provides a broad introduction to scholarly literature...
in mass communication. This one-year program is designed primarily for students without prior academic work in communication, experienced media professionals who wish academic preparation for teaching, or coterminal students at Stanford.

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 courses listed below. Communication 206 and 208 are required of all students; a minimum of seven additional courses must be taken in the department from:

201. Film Aesthetics
206. Communication Research Methods
216. Media Law
225. Perspectives on American Journalism
231. Media Ethics and Responsibility
233. Communication and Culture
239. Literature of the Press
240. History of American Journalism
241. History of Film
246. Journalism History
257. Public Information Programs
260. Political Communication
269. Communication, Technology, and Society
270. Communication and Children
272. Psychological Processing of Media
273. Communication and Health
276. International Communication
278. Media Management

Additional courses are selected in consultation with an academic adviser.

JOURNALISM

The graduate program in Journalism is a one-year professional program designed for students with an interest in the news-editorial areas of journalism. Students without significant journalism experience or an undergraduate degree in journalism are encouraged to apply. However, basic coursework in reporting and editing must be completed before the beginning of the academic year (Autumn Quarter). This is not a requirement for admission but it is a prerequisite for enrollment.

The master's degree requires a minimum of 47 units, including 4 units dedicated to a master's project. All courses must be selected in consultation with (and approved in writing by) an academic adviser. Amendments to, or deviations from, the approved Program Proposal must be approved in writing by an adviser. To remain in good standing, students must maintain an average letter grade indicator (LGI) of 'B.' Students who do not remain in good standing may not be able to complete the program. The students share a core of six courses as follows:

216. Media Law
225. Perspectives on American Journalism
240. History of American Journalism
275. Reporting of Public Affairs
290. A.M. Project
291. Graduate Journalism Seminar

Students are required to take a minimum of four additional courses, two in specialized writing and two in communication.

The two specialized writing courses must be chosen from the following:

236. Broadcast Journalism
250. Magazine Writing
277B. Science Writing
277F. Feature and Analytical Writing
277G. Social Issues Reporting
280. Film Criticism

The two communication courses must be chosen from the following:

201. Film Aesthetics
206. Communication Research Methods
208. Mass Communication Theory
222A. Documentary Film
231. Media Ethics and Responsibility
241. History of Film
242. Broadcasting in America
257. Public Information Programs
260. Political Communication
269. Communication, Technology, and Society
270. Communication and Children
272. Psychological Processing of Media
273. Communication and Health
276. International Communication

Two additional courses from within or outside the department are selected in consultation with an academic adviser. In addition to coursework, the journalism program requires satisfactory completion of a master's project.

DOCUMENTARY FILM AND VIDEO

The Documentary Film and Video A.M. program is designed to train filmmakers in the production of nonfiction films. The curriculum requires 5.5 academic quarters of residency: full-time registration is required in the first year. Students may choose one quarter in the second year in which to register half-time. Half-time registration usually occurs in the Winter Quarter, when students are typically shooting their A.M. projects. During the first year of study, students are required to complete:

202A,B,C. Graduate Colloquium in Film and Television (three quarters)
222A. Documentary Film
223A,B,C. Documentary Film/Video Directing (three quarters)
224A,B,C. Documentary Film/Video Production (three quarters)

During their second year of residence, students are required to complete 292A,B,C. Documentary Film and Video A.M. Project Seminar (three quarters).
quarters). A minimum of two electives are to be taken from each of the following lists. The fifth elective can be from either group. Students may petition to take a fifth elective not included here with the approval of her/his adviser. The course should be relevant to the subject matter of the A.M. project. The following is based on current information.

1. Departmental Electives
115. Ethnographic Film
138. Film Images of African-American Culture
201. Film Aesthetics
206. Communication Research Methods
208. Mass Communication Theory
210. Communication and Law
216. Media Law
220. Mass Media and Society
225. Perspectives on American Journalism
231. Media Ethics and Responsibility
240. History of American Journalism
241. History of Film
242. Broadcasting in America
243. Seminar in Communication Institutions
257. Public Information Programs
260. Political Communication
269. Communication, Technology, and Society
270. Communication and Children I
271. Communication and Children II
272. Psychological Processing
273. Communication and Health
280. Film Criticism

2. Other Electives: the list will be part of your orientation packet.

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. These costs currently approximate $1,800 for the first year of residence.

In the second year students produce their diploma films. Costs vary depending on subject, medium, length, and logistics, but $5,000 represents the minimum cost.

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. In addition, Ph.D. students must complete a minimum of four literature survey courses and four advanced seminars in communication and related departments. Each student builds a research specialty relating communication to such areas as campaigns, children, ethics, health, information processing, law, organizations, politics and voting, psychological processing, or 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 residence requirements, Ph.D. candidates are required to:

1. Complete all departmental course requirements with an LGI of at least 'B.'
2. Pass general qualifying examinations by the end of the second quarter 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 specialization. Chosen with the advice of the faculty, such tools may include foreign languages, statistics, computer programming, and so on.
4. Complete a first research project and a pre-dissertation research project.
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.

Students are expected to complete departmental examinations and a first project by the end of the second year of study, after which they must apply for admission to candidacy.

Because the multifaceted nature of the department makes it possible for the Ph.D. student to emphasize one of several areas of communication study, there tend to be several “typical” programs of course work followed by students, depending on their area of specialization. The variation in course programs tends to occur after the first year of graduate study, since the first year is devoted primarily to the “core” courses required of all students.

In addition, students must complete other advanced Communication theory courses. 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 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 this department. The balance
among communication theory, methods, and applications courses are determined by the candidate and his or her adviser.

THE INSTITUTE FOR COMMUNICATION RESEARCH

This institute operates as an office of project research for the faculties of the Department of Communication on grants from foundations, communication media, and other agencies. Research assistantships are often available to qualified Ph.D. students in communication.

MASS MEDIA INSTITUTE

During Summer Quarter, the Department of Communication conducts a series of eight-week workshop production courses in Film Production, Screenwriting, Broadcast News, and Professional Journalism. These are designed as preprofessional training courses and are open to students with junior or higher standing at Stanford and other colleges and universities. Additional courses in Film Aesthetics and Mass Communication in Society are also offered. Stanford undergraduates may apply a maximum of 12 units to their communication major requirements.

Information about the Mass Media Institute may be obtained by writing to: Director, Mass Media Institute, Department of Communication, Stanford University, Stanford, CA 94305-2050.

COURSES PRIMARILY FOR UNDERGRADUATES

1. Mass Communication and Society — Open to non-majors. Introductory survey on concepts and issues bearing on the role and responsibilities of mass media in society, including the organization and structure of mass media, the power and influence of mass media, and the tensions inherent in a system of mass communication committed to private enterprise and public service. Lecture plus one-hour weekly discussion sections. DR:9(5)
   5 units, Aut (Kinsey)

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.
   3-4 units (Breitrose)
   alternate years, given 1995-96

101S. Film Aesthetics — (Graduate students register for 201S.) 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.
   5 units, Sum (Staff)

104. Reporting and Writing the News — Reporting and writing, emphasizing various forms of journalism: news, broadcast, interpretation, features, opinion. Detailed criticism of writing. Prerequisite: typing speed of 35 wpm.
   5 units, Aut, Spr (Maharidge)
   Win (Staff)

106. Communication Research Methods — (Graduate students register for 206.) Formulation of research problems and design, sampling, data collection, and statistical analysis. Basic research approaches: experiments, surveys, and content and secondary analysis. A variety of studies are critically evaluated. Class designs and conducts a small communication study. Prerequisite: statistics. DR:9(5)
   4 units, Aut (Detenber)

108. Mass Communication Theory — (Graduate students register for 208.) Mass communication processes and effects. The relationship between media, individuals, and society. DR:9(5)
   4 units, Spr (Detenber)

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, Win (Calvert)

114. Introduction to the Moving Image — Students acquire the basic practical and conceptual skills to write, shoot, direct, and edit. Prerequisite: 1.
   5 units, Aut, Spr (Staff)

115. Ethnographic Film — (Same as Anthropology 128.) The ethnographic film as a documentary form examined through viewing and analysis of classical and current films. Comparison of film and video tapes with written monographs as a tool for understanding and representing culture. Film for anthropological research. Issues of authenticity and legitimacy in representing cultures. Recommended: 1. DR:9(5)
   5 units, Win (Gibbs)

122A. Documentary Film — (Graduate students register for 222A.) 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.
4 units, Aut (Krawitz)

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.
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.
4 units, Win (Glasser)

136. Broadcast Journalism — (Graduate students register for 236.) Survey of broadcast journalism, focusing on commercial and public broadcast news outlets. Not a pre-professional skills course; students are introduced to broadcast newswriting and prepare tapes for radio news broadcast. Additional lab. Prerequisite: 104.
4 units, Spr (Staff)

138. Film Images of African-American Culture — (Same as Anthropology 130, Afro-American Studies 122.) The nature of images of African Americans and African-American culture as portrayed on film. The sources of those images (including sources of African-American culture itself), their variations, and how they have changed over time. Historical trends are related to changes in overall American race relations and American popular culture, including the filmic media. Links to African-Americans' self-conceptions and their status and power in American society. DR:3
5 units (Gibbs)
alternate years, given 1995-96

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, Win (Lewenstein)

141. History of Film — (Graduate students register for 241.) Studies in the development of the motion picture as art form and cultural industry. Lab. Screenings of films announced in class.
4 units, Win (Breitrose)

142. Broadcasting in America — (Graduate students register for 242.) The development of American broadcasting and its contemporary problems.
4 units (Breitrose)
alternate years, given 1995-96

150. Magazine Writing — (Graduate students register for 250.) Practice in writing magazine articles, with emphasis on marketing manuscripts. Conferences. Prerequisite: 104.
4 units, Spr (Maharidge)

157. Public Communication Campaigns — (Graduate students register for 257.) Emphasizes health information programs and their effects on public knowledge, attitudes, and behavior; also 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. DR:9(5)
4 units, Win (Flora)

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. DR:9(5)
4 units (Chaffee)
alternate years, given 1995-96

160D. Cinema and Literature — The two-way relationship of literature and cinema from 1900, primarily in the U.S. and England. The modes of narration and the development of genres in both media. Topics: role of the novel in the rise of classical narrative cinema, and early theorization of film by Russian director Sergei Eisenstein and others; the "Victorian Sensibility" of silent American cinema, particularly films of D. W. Griffith; Dickens and the idea of an English national cinema; F. Scott Fitzgerald, Rudolf Valentino, and the birth of the "star"; film noir and hard-boiled fiction, a cross-media post-war aesthetic; Chaplin and Beckett, slapstick as high art; constructing the horror genre in novel and film. Mandatory evening screenings.
5 units (Marsh)
alternate years, given 1995-96

169. Communication, Technology, and Society — (Graduate students register for 269; same as Sociology 133/233; Science, Technology, and Society 162.) Methods for analyzing and addressing the question: Does technology drive societal change or does society drive technological change? Three case studies: computers and the self, mass media
and community, and the information economy. DR:9(5)
4 units, Spr (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. DR:9(4)
4 units, Win (Roberts)

171. Communication and Children II — (Graduate students register for 271.) Research practicum; limited enrollment; consent of instructor. Prerequisite: 170.
3 units, Spr (Roberts)

172. Psychological Processing — (Graduate students register for 272.) Examines literature related to psychological processing and 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.
4 units, Spr (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, Win (Abel)

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.
177B. Science Writing — (Graduate students register for 277B.)
4 units, Spr (Lewenstein)

177F. Feature and Analytical Writing — (Graduate students register for 277F.)
4 units, Win (Bettinger)

177G. Social Issues Reporting — (Graduate students register for 277G.)
4 units, Win (Maharidge)

178. Media Management — (Graduate students register for 278.) The management and financial aspects of media organization. Topics: capital investment decisions, circulation and audience-share planning, advertising strategies, personnel management, new technologies and their influence on business decisions, financial controls and promotion. The interplay between editorial and business decisions. Prerequisite: consent of instructor.
4 units, Spr (Lewenstein)

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, Spr (Breitrose)

185. Internship Experience — Professional experience in the media. Prerequisite: Communication major.
1-4 units, Aut, Win, Spr (Lewenstein) by arrangement

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)

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) by arrangement

PRIMARILY FOR A.M. STUDENTS
200S. Film Production Workshop — Introduction to film writing and production techniques, covering the basics of cinematography, sound, and editing. Students do one or two short super-8 projects, using this as a sketchbook for 16mm, with each student producing, shooting, and editing a 2-minute, black and white film with mixed sound track.
9 units, Sum (Staff)

201. Film Aesthetics — Graduate section; see 101.
201S. Film Aesthetics — Graduate section; see 101S.

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, Aut, Win, Spr (Staff)

204S. Reporting and Writing the News — Reporting and writing, emphasizing various forms of journalism: news, interpretation, features. Assignments are completed under realistic time and space constraints. Lectures and labs focus on skills needed to produce polished publishable material.
5 units, Sum (Staff)

206. Communication Research Methods — Graduate section; see 106.

207S. Editing the News — Copy editing, headline writing, news display and photo cropping. Lab in-
eludes editing copy, Associated Press style, news circulation, and page make-up.

4 units, Sum (Staff)

208. Mass Communication Theory — Graduate section; see 108.

208G. Advanced Mass Communication Theory — Mass communication processes and effects. The relationship between media, individuals, and society. Prerequisite: Media Studies graduate student. 4 units, Aut (Detenber, Kinsey)

209S. Broadcast News Workshop — News production techniques and a lab emphasizing reporting techniques. Training in producing, directing, writing, and delivering television newscasts. 9 units, Sum (Staff)

210. Communication and Law — Graduate section; see 110.

211S. Screenwriting — Fundamentals of screenwriting for film and television: structure, plot and subplots, dialogue, exposition, character, and backstory. The business and logistics of the professional scriptwriter (agents, WGA, pitching, etc.). 5 units, Sum (Staff)

212S. Script Analysis — Knowing how a script translates to the screen is essential for the screenwriter. Analyzes classic, paradigmatic films and their scripts for the purpose of understanding successful structures, strategies, and techniques of screenwriting. 4 units, Sum (Staff)

216. Media Law — 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, and others. Prerequisite: graduate student. 5 units, Aut (Calvert)

220S. Mass Communication and Society — The nature of communication and social responsibilities of the media, structure of the industry, problems of regulation, management, educational, and commercial interests. Guest speakers from the industry and related fields. Does not replace Communication 1 for department majors. 3 units, Sum (Staff)

222A. Documentary Film — Graduate section; see 122A.

222B. Documentary Film/Video Directing II — For graduate students. Further professional training in pre-production and producing for motion pictures and television. Interview skills and other documentary directing techniques are developed utilizing video. Taken concurrently with 224B. Prerequisite: 223A. 5 units, Win (Samuelson)

222C. Documentary Film/Video Directing III — For graduate students. Further examination of structure, emphasizing writing and directing the documentary. Practical training in fundraising and distribution. Taken concurrently with 224C. Prerequisite: 223B. 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: registration in 223A. 5 units, Aut (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. Prerequisite: successful completion of 223A and 224A, concurrent registration in 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 and 224B. Issues of documentary form and content. Prerequisites: successful completion of 224A and 224B, concurrent registration in 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.

234. Mass Media and Subjectivities — (Same as Anthropology 235.) Graduate seminar on critical approaches to mass media and popular culture. Object is to collaborate in developing methodologies and critiques and to interrogate prevailing theoretical perspectives. Emphasis is on feminist perspectives, national and transnational circulation and reception of popular texts, questions of narrativity, identity and agency, and cross cultural conceptions of subjectivity. Evening sessions required. 5 units, Aut (Mankekar)
236. Broadcast Journalism — Graduate section; see 136.

240. History of American Journalism — Graduate section; see 140.

241. History of Film — Graduate section; see 141.

242. Broadcasting in America — Graduate section; see 142.


4 units, Spr (Breitrose)

250. Magazine Writing — Graduate section; see 150.

257. Public Information Programs — Graduate section; see 157.

260. Political Communication — Graduate section; see 160.

269. Communication, Technology, and Society — Graduate section; see 169.

270. Communication and Children I — Graduate section; see 170.

271. Communication and Children II — Graduate section; see 171.

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.

3 units, Aut (Risser)

276. International Communication — Graduate section; see 176.

277. Specialized Workshops — Graduate section; see 177.

277B. Science Writing
277F. Feature and Analytical Writing
277G. Social Issues Reporting

278. Media Management — Graduate section; see 178.

280. Film Criticism — Graduate section; see 180.

290. A.M. Project

4-8 units, any quarter (Staff) by arrangement

291. Graduate Journalism Seminar — Required of all A.M. journalism students. Discussions 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 (Staff)

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.

6 units, Aut (Samuelson)

Win (Breitrose, Krawitz)

299. Individual Work

1-4 units, any quarter (Staff) by arrangement

PRIMARILY FOR Ph.D. STUDENTS


1-3 units (Chaffee)

alternate years, given 1995-96

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 (Roberts)

313. Introduction to the Use of the Computer — Specifically for science data analysis. A brief discussion of computing concepts, followed by use of Wylbur and Edit, text editors on SCIP and LOTS systems; SPSS; and data storage.

1-3 units, Aut (Staff)

317. Doctoral Research Methods I — Application of scientific method to communication research. Logic of inquiry; conceptualization of variables: design of experiments, quasi-experiments, and nonexperiments. Pre- or corequisite: enrollment in statistics.

4 units, Aut (Reeves)

318. Doctoral Research Methods II — Continuation of 317. Sampling questionnaire design, attitude scale construction, survey administration, computer analysis of data.

4 units, Win (Nass)

319. Doctoral Research Methods III — Continuation of 318. Project-oriented approach to relationship between theory and data analysis; advanced topics in data analysis.

3-4 units, Spr (Chaffee)

331G. Seminar in Media Ethics and Responsibility — Limited to Ph.D. students. Advanced topics in press ethics and responsibility. Prerequisite: 231 or consent of instructor.

1-3 units, Spr (Glasser)
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 1995-96

357. Public Information Programs — Doctoral section; see 157.
3-4 units, Spr (Flora)

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, Spr (Flora)

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) alternate years, given 1995-96

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) alternate years, given 1995-96

372. Advanced Communication Theory and Method Seminar III — May be repeated for credit. Topic and instructor change each year. Prerequisites: 311A, 319.
1-3 units, Win (Staff) by arrangement

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 communication and health. Prerequisite: 273 or consent of instructor.
1-3 units, Win (Flora)

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) alternate years, given 1995-96

3 units (Staff) by arrangement

397. First Research Project — Individual research in lieu of master's thesis.
3-6 units, Aut, Win, Spr (Staff) by arrangement

398. Pre-Dissertation Research Project — Advanced research for Ph.D. candidates.
3-6 units, Aut, Win, Spr (Staff) by arrangement

399. Advanced Individual Work
1-8 units, Aut, Win, Spr (Staff) by arrangement

400. Dissertation Research
6-10 units, Aut, Win, Spr (Staff) by arrangement

COMPARATIVE LITERATURE

Emeriti: (Professors) Joseph Frank, John Freccero; (Courtesy Professor) W. B. Carnochan
Chair: Jeffrey T. Schnapp
Director of Admissions: Carolyn Springer
Director of Graduate Studies: John Bender
Director of Undergraduate Studies: Thomas Hare

Professors: John Bender (English and Comparative Literature), Russell Berman (German Studies and Comparative Literature), René Girard (French and Italian, and Comparative Literature), Hans Ulrich Gumbrecht (French and Italian, Spanish and Portuguese, and Comparative Literature), Herbert Lindemberger (English and Comparative Literature), Valentin Y. Mudimbe (French and Italian, and Comparative Literature), Patricia Parker (English and Comparative Literature), Mary Louise Pratt (Spanish and Portuguese, and Comparative Literature), Ramon Saldívar (English and Comparative Literature), Jeffrey Schnapp (French and Italian, and Comparative Literature), Hayden White (Comparative Literature, Winter)

Associate Professors: Thomas Hare (Japanese and Comparative Literature), Elisabeth Mudimbe-Boyi (French and Italian, and Comparative Literature), Carolyn Springer (French and Italian, and Comparative Literature)

Assistant Professor: David Palumbo-Liu (Comparative Literature)

Courtesy Professors: Sandra E. Drake (English and Comparative Literature), Gerald Gillespie (German Studies and Comparative Literature), David G. Halliburton (English and Comparative Literature), Charles R. Lyons (Drama and Comparative Literature), John Wang (Asian Languages and Comparative Literature)
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

As contrasted with conventional literature majors which promote the study of a single national literature, a major in Comparative Literature involves the additional challenge of studying national literatures in their relations to one another. Such a comparative approach requires not just a solid grounding in multiple languages and literatures, but also the study of poetics, literary criticism, and theory, and of literature’s relation to other disciplines, arts, and media (film, video, and so on). The advantage of this broad approach to literary study is that it provides students with the opportunity to probe questions that are fundamental to the literary fields as a whole and, more generally, to all forms of humanistic inquiry: for example, questions regarding the nature of representation and interpretation, how cultural traditions take shape and undergo change, how high and low cultural forms may interact with one another, of form’s relation to content and vice versa. The Department of Comparative Literature offers students the opportunity to undertake such a program of study by combining rigorous training in a principal literature and in literary theory and interpretation with the study of a second literature and/or field. The major additionally requires a core of course work built around the student’s principal area of specialization, as well as one course from outside this area meant to provide an unfamiliar vantage point on the area of specialization.

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 "comparative" aspect of their program of specialization is fulfilled according to which of two available tracks they elect to follow.

1. **Literary Studies**: Track A 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.

2. **Interdisciplinary**: Track B integrates in-depth work in a primary literature with the focused study of literature in relation another art (music, painting, film, and so on) or intellectual discipline (philosophy, history, linguistics, anthropology, and so on).

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 each of these tracks, students work closely with the Director of Undergraduate Studies in designing an individually tailored program of specialization involving two related areas of study. Individual study requires considerable advance planning and must meet the approval of the Director of Undergraduate Studies.

CORE REQUIREMENTS
FOR TRACKS A AND B

All majors in Comparative Literature (including honors) complete the following Comparative Literature (CL) courses, the first as close as possible to the date of declaration and the second during senior year. Together, these core seminars ensure that majors have been introduced to the framing propositions and principal methods of the discipline. 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, introduces students to the comparative study of literature, to the history of poetic theory, and to the historical development of literary fields. The course is concerned with foundational questions such as: What kind of knowledge is literary knowledge? How has this knowledge been codified and categorized with respect to other forms of knowledge?

2. CL 199, Senior Seminar on Literary Theory, offers advanced students of comparative literature the opportunity for in-depth study of the evolution of modern literary theory and of contemporary theoretical perspectives regarding the study of literary artifacts.

LITERARY STUDIES TRACK

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:

- "Comparative Literature for Undergraduates" (CL 199, Senior Seminar on Literary Theory), which introduces students to the comparative study of literature, to the history of poetic theory, and to the historical development of literary fields. The course is concerned with foundational questions such as: What kind of knowledge is literary knowledge? How has this knowledge been codified and categorized with respect to other forms of knowledge?

- CL 101, Seminar on Literature and the Institution of Literary Study, which introduces students to the comparative study of literature, to the history of poetic theory, and to the historical development of literary fields. The course is concerned with foundational questions such as: What kind of knowledge is literary knowledge? How has this knowledge been codified and categorized with respect to other forms of knowledge?
1. Five courses, using materials in the original language and making up an intellectually coherent program, in the literature of the first language, plus three courses, using materials in the original language, in the literature of the second language. These course selections must be coordinated with the courses selected in the literature of the first language in order that, taken together, they form a cohesive program of study focused on one of the following:

a) a specific literary genre
b) an historical epoch
c) a theoretical question

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 100 or 199) may be counted under this rubric.

3. One course, usually in translation, on a literature distant from the literatures of the student’s concentration that can provide an “option” perspective on the student’s area of specialization.

4. Write at least one seminar paper that is comparative in nature. This paper should bring together material from courses taken in the primary and secondary literatures and may be an honors paper (see below), an individual research paper (developed through independent work with a faculty member, for example, 198), or may integrate materials developed for two separate courses (by arrangement with the two instructors). 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.

Note—If either the first or second language 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 any language above is Chinese, Japanese, or Russian, language above is Chinese, Japanese, or Russian, such 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
b) in the cultural history of a single historical epoch.

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. 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 concentrations and intended, as above, to offer an “outside” perspective on the student’s field of specialization.

4. Write at least one seminar paper that is interdisciplinary 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, for example, 198), or may integrate materials developed for two separate courses (by arrangement with the two instructors). 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 on alternate years.

Note—It is worth emphasizing that, as even a cursory review of Courses, Degrees, and Information 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 currently unavailable to Stanford undergraduates: namely, a major analogous to the English Department’s “English with an Interdisciplinary Emphasis” track but grounded in the study of non-English literature(s) and offering broad training in literary theory.

INTERDISCIPLINARY TRACK

Literary creation is a complex human enterprise that intersects a wide array of other fields of human endeavor and creation. This track is designed to promote the focused study of intersections between literature and another art (music, painting, film, and so on.) or discipline (philosophy, history, linguistics, anthropology, feminist studies, and so on.) 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
b) in the cultural history of a single historical epoch.

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. 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 concentrations and intended, as above, to offer an “outside” perspective on the student’s field of specialization.

4. Write at least one seminar paper that is interdisciplinary 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, for example, 198), or may integrate materials developed for two separate courses (by arrangement with the two instructors). 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 on alternate years.

Note—It is worth emphasizing that, as even a cursory review of Courses, Degrees, and Information 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 currently unavailable to Stanford undergraduates: namely, a major analogous to the English Department’s “English with an Interdisciplinary Emphasis” track but grounded in the study of non-English literature(s) and offering broad training in literary theory.
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 track allows for either a “Literary Studies” or an “Interdisciplinary” emphasis and requires:

1. Six courses, using materials in the original language and making up an intellectually coherent program in the literature of first language.

2. For a Literary Studies Emphasis:
   a. Three courses, using materials in the original language, in the literature of second language. These course selections must be coordinated with the courses selected in the literature of first language 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
   b. 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.

3. For an Interdisciplinary Emphasis: six courses in either a single discipline or in the cultural history of a single historical epoch. This course work must be shaped around the literature courses selected in item 1. It must either treat cognate analytic or thematic issues in the chosen discipline or be directly relevant to the chosen historical specialization. Each of these six courses must be approved in advance by the Director of Undergraduate Studies.

4. 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.

5. During the 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) an updated transcript
   b) a sample seminar paper
   c) an intended plan of study for the senior year (drawn up according to the emphasis selected)
   d) a preliminary statement (two to five pages) regarding the proposed topic of the honors paper (elaborated in consultation with the Director of Undergraduate Studies)

   This application is voted on by the Comparative Literature honors committee and, should it be approved, a faculty tutor is appointed by the Director of Undergraduate Studies according to the topic.

6. Once his or her request for admission to the honors track has been approved, the student must enroll in a 3-unit tutorial with the faculty tutor during the 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.

7. During Winter Quarter of the senior year, the student must enroll in a 5-unit independent study (CL 198) 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 are forwarded to the honors committee, which decides on the basis of the paper’s quality whether or not the student is awarded honors. If the faculty tutor feels that the paper 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. Two copies of the final paper must be submitted to the honors committee no later than the fifth week of Spring Quarter in order to be considered for honors in Comparative Literature.

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.

Note — Track A’s rules regarding the student’s native languages, bilingualism, and special exemptions for students studying Chinese, Japanese, or Russian also govern students in the honors program who opt for a Literary Studies emphasis.

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 de-
signed 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 graduate 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. Those who consider English or American literature a major field of study should take the subject test on "Literature in English." 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 non-native 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, though 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. Comparative Literature 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. Students whose primary field is a non-native language are required to take two courses in one additional literature not their own.

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 will cover 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
A minimum of six graduate courses, of which have:

1. A knowledge of at least two foreign languages, and Comparative Literature described among the in English are directed to the program in English departments. Students working toward the Ph.D. toward the Ph.D. in the various foreign language examination committee, but heed not be the same.

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 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.

10. Egyptian East/Egyptian West — 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 cosmopolitan, ethical, philosophical, and imaginative texts left behind by the ancient Egyptians. Egypt as a reflection of contemporary attitudes about gender, language, and multiplicity.

5 units, Spr (Hare)

20. Misogyny and Feminism in the Renaissance — (Same as French and Italian 55E.) Examines the debate on women's alleged biological, intellectual, and moral inferiority that was a central preoccupation of the European Renaissance. Influential arguments on the "querelle des femmes." How they are contextualized in a variety of literary genres, including courtly dialogues, conduct books, philosophical treatises, and chivalric poetry. Texts from the Italian Renaissance (Barbaro, Alberti, Castiglione, Ariosto, Machiavelli), with parallel developments in England and France.

4 units, Win (Springer)

30. European Fiction: Myth and Religion — (Same as French and Italian 270E.) Nine masterpieces ranging from the Middle Ages to WWII. Discussed emphasize relationships of desire and conflict. Readings: Chrétien de Troyes, Yvain, Le Chevalier au Lion; Cervantes, Don Quixote; Voltaire, Candide; Flaubert: Madame Bovary; Dostoievski, Notes from the Underground; Proust, Combray; Franz Kafka, Metamorphosis; Thomas Mann, Mario and the Magician; Virginia Woolf, The Waves.

4 units, Aut (Girard)

40. Seminar: Modernism, Fascism, and Technology — Introduction to modernism in the context of
the second Industrial Revolution and its accompanying technologies. The formative influence of the concepts of energy, work, production, and scientific management on the construction of the modernist subject and ultimately of the fascist nation. The transposition of these concepts from the realms of science (thermodynamics) and technology to those of aesthetics and politics. Topics: bodies and machines, racial and technological notions of energy, cognitive ramifications of communications technology, psychophysics, fascism and aviation, virility and degradation, the race and the nation as technological and aesthetic constructs.

3-5 units, Aut (Pridmore-Brown) TTh 11-12:15

50. A History of Western Theater and its Stages — (Same as French and Italian 50E.) History of western theater from the Middle Ages to the present, emphasizing the tradition of “theater” as a specific institution of European culture and relating the theatrical texts, plots, and contents to the historically changing material conditions of their performance and to the changing situations of their audience. Discussion and analysis of cultural forms, e.g., religious and political rituals, professional (“spectator oriented”) sports, and contemporary media, e.g., film and television.
5 units (Gumbrecht) given 1995-96

60. The Representation of Reality in Fiction and History — The problem of representing “history” and “time” in literature, philosophy, and social theory during the period of high modernism and fascism, 1920 to 1970. Emphasis is on the question of the relation between history and memory in the representation of the Holocaust from writers (Mann, Sartre, Woolf, and Levi); poets (Eliot, Benn, Yeats, and Celan); critics (Auerbach, Frey, Barthes, and Friedlander).
5 units, Win (White) TTh 11-12:30

101. Seminar on Literature and the Institution of Literary Study — (Same as English 100.) Introduction to the comparative study of literature and to the history of poetic theory. The nature (and value) of literary interpretation; the relation of literature to other arts and forms of knowledge; the means by which literary study is institutionalized within the university. Enrollment limited to 15.
5 units, Spr (Lindenberger) MW 2:15-4:05

199. Senior Seminar on Literary Theory — For advanced students of Comparative Literature providing for in-depth study of the evolution of modern literary theory and of contemporary theoretical perspectives regarding the study of literary artifacts.
5 units, given 1995-96

RELATED OFFERINGS
Courses primarily of a comparative nature are listed below.

95. The Japanese Language in Culture and Society — (Enroll in Asian Languages 95.)
4 units, Spr (Matsumoto) MW 1:15-2:30

113. Zhuang Zi — (Enroll in Asian Languages 113, Philosophy 113, Religious Studies 113.) History of western philosophical interpretations of the Daoist text, the Zhuang Zi. Survey of interpretations emphasizing works of A. C. Graham, Chad Hansen, Wu Kuang-ming, Lee Yearley, and David Wong. No Classical Chinese required. Separate readings for those who know Classical Chinese. Prerequisite: Philosophy 46 or consent of instructor.
5 units (Ivanhoe) not given 1994-95

130. The Novel — (Enroll in English 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. DR:7(2)
5 units, Spr (Paulson)

131. Chinese Poetry in Translation — (Enroll in Asian Languages 131.) Readings in traditional poetry and poetics emphasizing genre, theme, and style. DR:7(2)
4 units, Aut (Liu) TTh 1:15-2:30

132. Chinese Fiction and Drama in Translation — (Enroll in Asian Languages 132.) Survey of fiction and drama from early times to the 19th century, emphasizing literary and thematic discussions of major representative works available in English translation. DR:2(*) or 7(2*)
4 units, Win (Staff) MWF 11

133. Modern Chinese Literature in Translation — (Enroll in Asian Languages 133.) Readings in representative 20th-century works of fiction, drama, and poetry. DR:2(*) or 7(2*)
4 units, Spr (Lyell)

135. Japanese Drama in Translation — (Enroll in Asian Languages 135.) DR:2(*) or 7(2*)
4 units, Spr (Lyell)

138. Modern Japanese Literature in Translation — (Enroll in Asian Languages 138.) Introduction to Japanese poetry, drama, and fiction since 1868. Authors: Tanizaki, Kawabata, Mishima, etc. DR:2(*) or 7(2*)
4 units, Spr (Staff) MWF 1:15

150. Poetry and Poetics — (Enroll in English 150.) Introduction to reading poetry through a variety of poems, emphasizing the ways meanings are shaped through diction, imagery, figurative language, and technical elements of verse. DR:7(2)
5 units, Spr (Lindenberger)
150G. Poetry and Poetics—(Enroll in English 150G, Feminist Studies 164.) Introduction to the study of poetic techniques and genres (narrative, lyric, elegy, satire), emphasizing texts in which representations of gender difference play a significant role. Ovid’s Metamorphoses, Renaissance love lyrics, satiric verse from Alexander Pope to Queen Latifah, and contemporary American poetry that engages in dialogue with conventional notions of masculinity and femininity. DR:7(2)
5 units, Aut (Middlebrook)

151. Fyodor Dostoevsky—(Enroll in Slavic Languages 151.) Open to graduates, seniors, and juniors. Major works in English translation with reference to related developments in Russian and European culture and intellectual history. Lectures and discussion section. DR:7(2)
4 units, Aut (Frank) TTh 2:15-4:05

154 Exemplary Short Fiction in Spanish Renaissance—(Enroll in Spanish and Portuguese 154.) The notion of exemplarity as discursive and moral mechanism is analyzed in representative short stories from early modern Spain (Cervantes, Maria de Zayas, and the Moorish romance El Abencerraje). Issues of identity and subjectivity, genre and gender within a sociohistorical context.
3-5 units, Spr (Martin)

159. African-American Poets—(Enroll in English 159.)
5 units, Win (Holland)

160A. Narrative Film and Aspects of Modernism—(Enroll in English 160A.)
5 units, Win (Merritt)

161. Voyage, Quest, and Transformation—(Same as French and Italian 161.) Focuses on the motif of voyage and the character’s quest in order to achieve knowledge of the world and of the self and understanding or reconciliation with one’s self and/or with society.
3-5 units, Spr (Mudimbe-Boyi)

5 units, Spr (Porter)

163B. Cultural Studies of the City—(Enroll in English 163B.) The way individuals and groups represent themselves to themselves and thereby construct their identities in urban environments, or how the modern city looks from different perspectives. Materials span the industrial city of 19th-century Britain to the post-industrial or postmodern city of late 20th-century U.S. Topics: economic position, race, ethnicity, gender, work, leisure, space, property, security, danger, access to technology, and other components of urban identities. Genres: imaginative literature and social theory.
5 units, Win (Gagnier)

5 units, Aut (Gagnier)

164B. Imagining the Holocaust—(Enroll in English 164B.) How has literary imagination envisioned the destruction of European Jewry? The Holocaust and European, Israeli, and American responses, seen through documentation, diaries, fiction, poetry by Appelfeld, Borowski, Wiesel, Celan, Levi, Schindler’s List (Keneally), Roth, Malamud, and through visual art. Survivors address the class. DR:7(2)
5 units, Aut (Felstiner)

164C. Ecology and Imagination—(Enroll in English 164C.) Going into nature with poems, to see how words and images may sharpen our sense of a threatened physical and animal world. Psalms, Book of Job, Shakespeare sonnets, and some 18th-century verse, readings from Thoreau, Muir, Black Elk, Coleridge, Wordsworth, Keats, Dickinson, Whitman, Hopkins, Yeats, Dylan Thomas, W. C. Williams, T. S. Eliot, Frost, Stevens, Lowell, Hughes, Stafford, Kinell, Levertov, Snyder, Kenny, Harjo, Revard. (Area:H) DR:7(2)
5 units, Win (Felstiner)

165B. Arthurian Literature—(Enroll in English 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 the construction of gender roles. DR:7(2)
5 units, Spr (Lerer)

166. Introduction to Literary Theory—(Enroll in English 166.) Introduces upper-division undergraduates to the “state of the question” in contemporary critical theory. The basic tenets of theory as laid down by Plato and Aristotle, Russian Formalism, the Frankfurt school (especially Walter Benjamin), the post-Structuralism of Barthes, Derrida, and Foucault; some feminist criticism, media criticism (Baudrillard), and cultural studies (James Clifford).
5 units, Win (Perloff)

168A. 20th-Century American Indian Writing—(Enroll in English 168A.)
5 units, Aut (Warrior) TTh 1:15-5:05

169. Diasporic Identities—Writings of Asian Americans in transit through the U.S. (e.g.,
Kadohata’s *The Floating World*, Wong’s *Hoembase*). Asians moving from their native lands to the U.S. (Bulosan’s *America is in the Heart*, Mukherjee’s *Jasmine*, Law–Yone’s *The Coffin Tree*), and Asian writers who write in other countries (in Great Britain Mo’s *The Monkey King* and Ishiguro’s *An Artist of the Floating World*, Yamashita’s narrative of Japanese in Brazil, *In the Arc of the Rainforest*). Asian American literature in a global context, anchoring narratives in historical specificity. For comparative perspectives, essays on the Jewish and the African diasporas, the theory and criticism of diasporas, and African American and Chicano/a narratives. Themes are the ideas of “home,” community, nation, and identity.

5 units, Spr (Palumbo-Liu) TTh 11-12:30

169L. **Imagination and the Body** — (Enroll in English 169L.)

5 units, Aut (Gelder)

169M. **Identity in Mixed Media** — (Enroll in English 169M.)

5 units, Aut (Gelder)


3-5 units, Win (Franco)

182. **Chinese Lyric Aesthetics** — (Enroll in Asian Languages 182.)

4 units, Win (Liu) TTh 2:15-3:30

184. **Lusophone African Oral Literature** — (Enroll in Spanish and Portuguese 184.)

3-5 units, Aut (Carvalho)

186. **Undergraduate Seminar: Contemporary Thought in Latin America** — (Enroll in Latin American Studies, Spanish and Portuguese 179.) Reading/discussion of leading currents of social and political thought. Limited enrollment; consent of instructor by application at Bolivar House.

5 units, Spr (Galezao)

187H. **Seminar: Black Popular Culture** — (Enroll in English 187H.)

5 units, Aut (Holland)

187L. **Seminar: The Colonial and Post-Colonial Writings in India** — (Enroll in English 187L.)

5 units, Spr (Loomba)

188. **Russian Poetry of the 20th Century** — (Enroll in Slavic Languages 188.) Required of all majors in Russian literature. A continuation of 187.

Surveys main developments in Russian poetry in this century, focusing on Symbolism and post-Symbolist movements (Acmeism, Futurism, Constructivism, OBERIU). Close analysis of representative lyric poems of major modern poets (i.e., Bal’mont, Blok, Khlebnikov, Maiakovskii, Tsvetaeva, Pasternak, Sel’vinskii, Kharmas, and others). Prerequisite: 187 or consent of instructor.

4 units, Spr (Zorin) by arrangement

189. **Seminar: Caribbean Women Writers** — (Enroll in English 189.)

5 units, Win (Adisa)

190. **Modernism and the Humanities: Tolstoy’s Anna Karenina and the Social Thought of its Time** — (Enroll in Slavic Languages 190, Humanities 197F.)

5 units, Win (Freidin)

196. **Modern Chicano/a Fiction** — (Same as Chicano Studies 198, Spanish 186.) Readings of novels and short fiction by Rudolfo Anaya, Ana Castillo, Denise Chávez, Sandra Cisneros, Roberta Fernández, Arturo Islas, and Tomás Rivera. The evolution of Chicano/a literature; aspects of the Chicano/a historical and literary experience; themes such as the search for identity, mestizaje, problems of language use and choice, invisibility, silence, blindness, and gender as it relates to issues of ethnicity and class. Students add their own observations and discoveries.

4-5 units, Win (Espinosa)

206E. **The Grail Legend in Modern Culture** — (Enroll in French and Italian 206E.) Focusing on the legendary quest of the "Holy" Grail, explores the uses and transformations of medieval romance in modern culture. The first-known Grail romance (the *Story of the Graal*, Chrétién de Troyes, late 12th century). Traditional motifs: courtly love, life in the forest, and chivalric adventures in relation to the Grail as a symbol of an unattainable ideal, the re-inscriptions of those motifs in post-medieval culture, emphasizing films (e.g., *Excalibur*, *Monty Python and the Holy Grail*, *Indiana Jones and the Last Crusade*, *Apocalypse Now*). DR: 7(2)

3-5 units, Spr (Cazelles)

208E. **Female Saints** — (Enroll in French and Italian 208E.) Examination of the medieval lives of saintly women concentrating on: 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. DR: 8ft(3)

3-5 units, Win (Cazelles)

213. **Family Dynamics in Literature** — (Enroll in Modern Thought and Literature 213.) Psychological principles are applied to textual analysis; character
3 units, Spr (Van Natta)

214E. Imagine the Afterlife — (Enroll in French and Italian 214E.) Images of the afterlife in ancient and medieval mythology, literature, and religion. Relevant passages from the epic of Gilgamesh, Plato’s Phaedo and Republic, Homer’s Odyssey, and Virgil’s Aeneid, the Hebrew Bible and New Testament, Smith’s and Haddad’s The Islamic Understanding of Death and Resurrection, and Dante’s Divine Comedy supplemented by critical works and slides from the history of Western and Islamic art which depict images of the afterlife.
4-5 units, Spr (Harrison)

229A. Colloquium: Death and the Grotesque in Nature and African-American Literature — (Enroll in English 229A.)
4-5 units, Aut (Holland)

233C. Seminar: Post-WWII Transnational Art and Culture — Black and Jewish Diasporas in the U.S.— (Enroll in Art 233C.) The problems and paradoxes of identity and difference in the context of Black and Jewish artistic production and writing in the U.S. after WWII. Emphasis is on the geographical spaces the transnational connotes on these traditions; how the retrieval of African traditions and religions by African-Americans is different from a retrospective devaluation of Jewish-American ethnic differences in exile; intercellular history of the Diaspora concept; shifting meaning of race and ethnicity and how it emerges through and against historical discourses of gender and sexuality in the arts; the relation between Jewishness modernism and Blackness in the writing of Jewish art critics (Walter Benjamin, Clement Greenberg, and Meyer Schapiro); the contextual meanings of Black-Jewish solidarity and the significance of the legacy of blackface; Black aesthetics and its relation to American art; the feminization of the Jewish male body in the internal ethnic differences among Jews as represented in their family albums; and the commodification of blackness through notions (the “primitive,” the “folk,” and the “tribal”). Exhibition, Faces of the Gods, curated by Robert Farris Thompson; symposium at the de Young Museum.
4 units, Aut (Bloom)

233D. Undergraduate Colloquium: Feminisms and Contemporary Art History — (Enroll in Art 233D.) Focuses on feminine interventions in the history of art; the questions of sexuality in vision; shifts in feminist art practices from the 70s to the 90s; lesbian representations and queer theory; and images of “woman” by feminist artists and videomakers.
4 units, Win (Bloom)

233E. Dante’s Divine Comedy — (Enroll in French and Italian 233E.) Open to all students. Intensive study of Dante’s poem in relation to the culture and history of Medieval Europe. Topics: Dante and pre-Modern theories of autobiography; theology and poetics in the Comedy, Dante and the Natural Sciences, Dante’s Christianization of Classical Epic (Virgil, Lucan, Statius), the Comedy and Dante’s minor works. DR:7+(2)
3-5 units, Spr (Frecceiro)

241-243. (Enroll in German Studies 241-243) The history of German thought from 1750 to the present and its significance for an understanding of modern culture. Authors: Adorno, Freud, Herder, Hegel, Husserl, Marcuse, Marx, Nietzsche, Schiller, and Wittgenstein. (In English)

241. Deutsche Geistesgeschichte I — Language and thought from Leibniz to Humboldt, focusing on the emergence of a new aesthetic during the Enlightenment corresponding to ideas about a new type of Publikum comprising autonomous, rational subjects. Plays, political, and cultural theory, philosophy, and historical/cultural background texts.
3-5 units, Aut (Kenkel)

242. Deutsche Geistesgeschichte II — Cultural theory and historical meta-narrative from Romanticism to the Modernist threshold. Texts by Novalis, Hegel, Schopenhauer, Feuerbach, Marx, Stirner and Nietzsche. Readings in German (or in translation for generalists.)
3-5 units, Win (Gillespie)

3-5 units, Spr (Mueller-Vollmer)

245. Survey of Russian Literature in English Translation I: The Age of Experiment — (Enroll in Slavic Languages 245.) 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, 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 capitol (Pushkin’s “The Bronze Horseman” and “The Queen of Spades,” Gogol’s The Petersburg Tales, the young Dostoevsky’s TheDouble); Tolstoy’s memoirChild-
246. Struggles with Authority in the Russian Novel, 1861-1922 — (Enroll in Slavic Languages 246.) Readings of Turgenev's Fathers and Sons, Dostoievsky's Crime and Punishment, Tolstoy's Anna Karenina focus on the conflict between the individual and authority (social, moral, political) as a characteristic feature of the 19th-century Russian novel. Chekhov's short fiction and Andrei Bely's novel Petersburg as examples of the deformation and adaptation of this tradition at the end of the "age of Realism." Literary, social, and political contexts. DR:7(2)

4 units, Win (Moeller-Sally) MWF 11

247. State and Revolution: Russian Literature in the 20th Century — (Enroll in Slavic Languages 247.) Major works of Russian fiction and selected poetry, including the emigre and samizdat writings, in their literary and historical context (Babel, Bely, Blok, Brodsky, Grossman, Kataev, Mayakovskiy, Nabokov, Olesha, Pasternak, Sholokhov, Siniavsky, Solzhenitsyn, Zoshchenko, etc.). The way poets and novelists have constituted the post-revolutionary "historical experience" of the Russians. DR:7(2)

4 units, Spr (Freidin) MWF 10

248. Readings in Classical Film Theory — (Enroll in German Studies 248.) Questions and concepts of classical film theory, with an emphasis on central figures, key debates, and their pertinence for current discussions about film, spectatorship, gender, and mass culture.

3-5 units, Win (Rentschler)

248E. Machiavelli — (Enroll in French and Italian 248E.) Open to all students. In-depth introduction to Machiavelli’s works, The Prince, the Discourses, the Dialogo della lingua, and the theatrical works, emphasizing Machiavelli’s relation to classical and post-classical political theory and to the political institutions of his period.

3-5 units, Win (Frecero)

249E. Introduction to Hegel: Kojève and the End of History — (Enroll in French and Italian 249E.) Study of Alexander Kojève’s lectures on Hegel in Paris during the 1930s, emphasizing the interpretation of the "end of history." Readings: selections from Hegel’s Phenomenology, Kojève’s Introductory Lectures, and Fukuyama’s The End of History.

4-5 units, Spr (Harrison)

250. Topics/Cultural Studies: Constructing Interdisciplinary Projects — Seminar on methods for developing interdisciplinary projects. Discussions of Sibilla Aleramo’s memoir A Woman (1906) in the context of recent political theory, feminist sociology, and post-colonial and historiographic theory. Discussions of participants’ own interdisciplinary projects.

5 units, Win (Jed)

251E. F. T. Marinetti and Futurism(s) — (Same as French and Italian 251E.) Futurism (1909 to mid-1930s) developed into the first international cultural-political avant-garde movement. Its aim was the revolutionary transformation of all spheres of everyday life and its influence encompassed Europe (especially France, Italy, and Soviet Russia), parts of Asia (Japan), N. America, and Latin America (Ultrai smo, Brazilian Modernism, etc.). Seminar examines Futurist artistic/literary theory and practice from its foundation by Marinetti through its various avatars. Readings of Marinetti through his late ’30s “technicist” poetry; writings by Palazzeschi, Papini, Soffici, Apollinaire, Cendrars, Kruchenykh, Khlebnikov, Mayakovskiy, Crane, Williams, Pound, Lewis, Kambara Tal, Drummond de Andrade, Huidobro. Topics: machines and culture, the Futurist theater of surprise, poetry and performance, visual poetics and war, Futurism’s ties to Bolshevism and Fascism.

5 units, Spr (Schnapp)

258E. The Intellectual as Writer: Jean-Paul Sartre — (Same as French and Italian 258E.) The basic tenets and central themes of phenomenology. Close reading of J.-P. Sartre’s and M. Merleau- Ponty’s major philosophical works. Additional readings: Martin Heidegger, Edmund Husserl, Emmanuel Levinas, Gabriel Marcel, and Jose Ortega y Gasset.

3-5 units, Spr (Mudimbe)

259E. Paradigms of Modern Thought — Michel Foucault and the Archeology of Knowledge — (Same as French and Italian 259E.) Critical introduction to Michel Foucault’s theses and method and their significance for the individuation and specification of each culture and individual. Readings: texts by Foucault and excerpts from Georges Canguilhem, Georges Dumézil, and Jean Hyppolite.

3-5 units, Spr (Mudimbe)

260. Colloquium: The Bible in Literature — (Same as English 260.) Combines intensive reading from Genesis to Revelation (and Apocrypha) with selections from a range of literary texts (including medieval drama, Shakespeare, Spenser’s Faerie Queene, Milton, Renaissance lyric, the Brontës, and American, African, and African-American writing) and contexts where biblical authority is invoked, parodied, or transformed. Topics: the relation between biblical eschatology and literary structures, the love lyric and the Song of Solomon, biblical prototypes of gender difference, feminist rewritings of biblical authority, and the appeal to biblical texts in radical and hegemonic contexts.

4-5 units, Win (Parker) Th 3:15-6:05
261. Poetess: The Grammar of the Self When the Poet Is a Woman—(Enroll in Slavic Languages 261.) Examines individual strategies of “entry” into the lyrical (intimate-turned-public) “space,” distribution of roles and modes of address, legacy of tropes, and poetic lexicon shaped by a national male tradition. How does the female poet switch from object to 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 back-ground 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.  
4 units, Spr (Greenleaf) TTh 11-12:30

263. Readings of the Sublime—(Enroll in English 263.) The sublime in the perspective of the philosophy and aesthetics of alterity (Derrida, Levinas, Deleuze). The idea that the sublime undermines the rationality of Western thought. Discussion on texts of Shakespeare, Poe, Blake, Jeffers, Nietzsche, Kafka, Bataille, Dillard, and on visual materials.  
4-5 units, Win (Slawek)

264. The Latin American Novel of the Sixties: Cortézár, Vargas Llosa, García Márquez—(Enroll in Spanish and Portuguese 263.) Examination of the most important 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, Aut (Ruffinelli)

269. Castle of Purity: Family/Individual in Mexican Society (Cinema and Literature)—(Same as Spanish 269.) The influential father-mother figures, and the family as cradle of the collective and the individual, have changed since the Mexican revolution of 1910. Family and individual (as opposed and concurrent forces) in books and films; themes of self-slavery as the preservation of mythical purity, maternal love as a destructive force, homosexuality and the paradoxical role of the mother as (sex) provider, the cosmogony of food as a repression-free realm, and dancing as a displaced post-modern love story. European films as counter-balanced artistic expressions.  
3-5 units, Aut (Ruffinelli)

273A. The Modernist Novel I: Fin de Siècle to World War I—(Enroll in German Studies 273A.) Principal readings: Buddenbrooks, Death in Venice; Gide, The Immoralist; Joyce, Portrait of the Artist; Proust, Swann’s Way, In a Budding Grove.  
3-5 units, Win (Gillespie)

4 units, Spr (Girard)

278A. The Modernist Novel II: The Roaring Twenties—(Enroll in German Studies 278A.) Principal readings: Hemingway, The Sun Also Rises, Joyce, Ulsses, Mann, The Magic Mountain, Proust, Time Refound  
3–5 units, Spr (Gillespie)

291E. Sports and Culture—(Same as French and Italian 291E.) Intersections between cultural forms and athletics from Greek antiquity to the present. The question of how mass athletics emerged as the normative form of spectacle in the 1920s in terms of which all cultural forms had to define themselves. Topics: sport and drama in antiquity; convergences between poetic and athletic concepts of performance; physical culture and the discourse of race, national identity, cultural resurgence, and hygiene; the history of international athletic competitions (especially the Olympic games) and the forms of ritual and spectacle that developed around them; sports literature, analysis, commentary; dance, gymnastics, body building.  
5 units, Win (Gumbrecht, Schnapp) T 3:15-6:05

292E. Mimesis in Literature and Theory—(Enroll in French and Italian 292E.) The history of mimesis and its literary uses. Mimesis and imitation in aesthetics and human relationships, using principle works by René Girard. Readings: Elias Canetti—Crowds and Power; René Girard—Things Hidden since the Foundation of the World; Deceit, Desire, and the Novel; Violence and the Sacred; The Scapegoat; Job; The Victim of his People; Shakespeare—A Theater of Envy.  
4 units, Aut (Girard)

293. Verse Translation Workshop—(Enroll in English 293.) After examining 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)

293A. Gendered Perspectives: Literature, Criticism, Theory—(Enroll in German Studies 293A.) The relationship between gender and genre. Topics: feminism’s impact on theory, essentialism vs. historicism, positionality and politics, problems of grounding, feminism and deconstruction, who can “do” women’s studies? Readings by Salomé, Freud,
Weininger, Irrigaray, Cixoux, Kristeva, Spivak, Derrida.
4-5 units, Win (Knodt)

3-5 units, Aut (Hampton)

296. France in the Occupation: A Site of Memory and Controversy—(Enroll in French and Italian 296E.)
3-5 units, Spr (Loomba)

302C. Renaissance Colonialisms—(Enroll in English 302C.) Explores contact between early modern Europe and its "others," and how different models of colonial contact are offered by the journeys to the New World and voyages to the Orient. Ways in which these differences are expressed in and produced by travel narratives, plays, pageants, and other literatures of this period, relating these differences to issues within current postcolonial studies.
4-5 units, Spr (Loomba)

303D. The Culture of Seduction: Richardson, Mozart, Libertinism, and the Enlightenment—(Enroll in English 303D.) Focuses on four masterpieces of the 18th century that take the seduction of a woman (or women) as their central imaginative concern: Samuel Richardson's Pamela (1739-40) and Clarissa (1749-51), Mozart's The Marriage of Figaro (1786) and Don Giovanni (1787). Comic versions of the seduction plot in Pamela and The Marriage of Figaro. The subsequent "darkening" of the seduction theme in Clarissa and Don Giovanni. Reading/hearing of the basic works supplemented with readings from recent Richardson and Mozart criticism, and 18th-century intellectual and cultural history (Brigid Brophy's Mozart the Dramatist). Literary and musical-dramatic issues are juxtaposed, and the evolution of the seduction genres and artistic forms is traced.
4-5 units, Aut (Castle)

305. Colloquium: The Romantic Novel in Britain and America, 1749-1860—(Enroll in English 305.)
A comparative perspective on recurrent themes, tropes, and characterizations in fictions by Ann Radcliffe, Sir Walter Scott, Charles Dickens, James Fenimore Cooper, Nathaniel Hawthorne, and Harriet Beecher Stowe, etc.
4-5 units, Aut (Dekker)

306B. Colloquium: Afro-American Literature and Its Critics—(Enroll in English 306B.)
4-5 units, Win (Porter)

306H. Chicana-Chicano Poetry and Poetics since 1968—(Enroll in English 306H.)
4-5 units, Aut (Zamora)

307C. Colloquium: Methods and Materials for the Study of Modern Literature—(Enroll in English 307C.) Research techniques and library resources for conducting a Benjaminian mode of cultural inquiry into post-Enlightenment British and American literature (1750 to the present). Focuses on reconstructing the original ideological environments of selected modern works, including semantic, socio-economic, and technological dimensions. Attention to non-canonical and quasi-literary discourses used to historicize texts.
4-5 units, Spr (McPheron)

312. Seminar: Medieval Drama—(Enroll in English 312.) Survey of texts and conditions behind the forms of dramatic performance in the Middle Ages. The theatrical impulse behind medieval public life, drawing on surviving evidence of cycle plays, mysteries, moralities, and elements of pageant, spectacle, and religious observance. Systems of patronage. Issues in the "theory" of tragedy and comedy in the Middle Ages. Developments in modern approaches to the study of popular expressions and ritual.
4-5 units, Spr (Lerer)

314. Seminar: Epic and Empire—(Same as English 314.) Focusing on Virgil's Aeneid and its influence, traces the European epic tradition (Ariosto, Tasso, Camoes, Spenser, and Milton) together with New World discovery and mercantile expansion in the early modern period.
5 units, Win (Parker)

330. Colloquium: Institutions of Enlightenment—(Enroll in English 330E, History 330/430A.) Study of the cultural foundations on which the Enlightenment instituted a public sphere and constituted its relationship to the private (or intimate) sphere, concentrating on France and Britain.
4-5 units, Win (Baker, Bender)

333. Seminar in European Romantic Drama—(Enroll in German Studies 333A.) The psycho-historical lineaments of "modern" archetypical protagonists and antitheses, including Satan, Oedipus, Hamlet, Faust, and Don Juan: Romantic irony and paradigm shifts leading to epic and absurdist drama. Authors: Byron, Shelley, Goethe, Kleist, Büchner, Grabbe, Musset.
3-5 units, Spr (Gillespie)

348E. Stendhal—(Enroll in French and Italian 348E.) Open to undergraduates. Stendhal (i.e., Henri Beyle, 1783-1842) has been canonized, with Balzac and Flaubert, as one of the great "realistic" novelists. Close reading of Stendhal's novels Le Rouge et le Noir (1830) and La Chartreuse de Parme (1838)
and analysis of the techniques of the realistic novel in general. Focuses on unexplored aspects of Stendhal’s intellectually and socially marginal position within European Restoration, years in Italy, and the form of his (often fragmentary) writing based on a multiplicity of non-literary or semiliterary discourses.

3-5 units, Win (Gumbrecht)

349. Seminar: Narratology: Myth, Fiction, and History — (Same as French and Italian 349E, Spanish 394.) Recent theories of narrative, the cognitive status of stories in myth, fiction, autobiography, and historical writing, the social function of storytelling, and the attack on narrative as the substance of ideology in certain modernist and postmodernist writings. Works by critics such as Lukacs, Levi-Strauss, Bakhtin, Frye, Barthès, Ricoeur, De Man, Todorov, Gadamer, etc. and their theories applied to literary works by such writers as Balzac, Poe, Conrad, Mann, Woolf, Pynchon, et al.

5 units, Win (White) M 3:15-6:05

350. Chicano/a Poetry — (Same as Spanish 386.) Traces Chicano/a poetry from its earliest appearance as part of the Hispanic-American oral tradition, its publication in the Spanish language newspapers of the Southwest, to its modern evolution as a component of the American poetic canon. Theory of poetry in general and applications to the case of Chicano poetry in particular. Works by Alurista, ‘‘Corky’’ Gonzales, Montoya, Saenz, Alarcón, Gaspar de Alba, Cisneros.

4-5 units, Spr (Espinosa)

361. The Modern Tradition: Modernity and its Critics — (Enroll in English 361.)

5 units, Aut (Kaul)

369. Philosophies of Form — (Same as French and Italian 295E.) Focus is on concepts of ‘‘form’’ as one of the key issues in the contemporary epistemological situation. Analyzing different philosophies of form from a historical perspective. Debates in humanities (the common denominator is a shift from content/interpretation to a paradigm of form/description), with different aspects of the entropy/negentropy-model in the sciences and the social sciences. Seminar is on concepts of form in presocratic and Platonic philosophy, in medieval theology, and in baroque poetics, emphasizing Kant’s 3rd Critique and Hegel’s 3rd Critique, the phenomenological tradition (Bergson and Husserl) and its consequences for cultural history and the relation between philosophical positions (e.g., deconstruction) and scientific thought in our present intellectual situation.

5 units, Aut (Gumbrecht, Schnapp) T 3:15-6:05

372. Topics in French and Francophone Literature: The Discourse of (Self) Representation — (Same as French and Italian 372.) Critical analysis of major issues relating literatures in French and outside France, with a focus on Negritude and Surrealism, the question of the Other and the problematic of identity. In French

3-5 units, Spr (Mudimbe-Boyi)

377. Nationalism and Post-Nationalism: A Seminar on Literature, Art, and Cinema — (Enroll in Spanish and Portuguese 377.) Current debates about nationalism and post-nationalism could be a terrain for neo-colonialism in Latin America in the era of NAFTA and other international projects. Focus is on the concept and representation of nation and nationalism in Latin America (Mexico, Cuba, Argentina, and Venezuela) since 1800. Influential works of literature, art and cinema, and important theoretical and historical texts written by Latin Americans.

3-5 units, Spr (Ruffinelli)


3-5 units, Win (Dupuy)

384. Seminar: Poststructuralism and its Discontents — (Same as English 384, French and Italian 384E.) Focusing principally on Jacques Derrida, examines the continuing influences and critiques of poststructuralist writing, including in the areas of orientalism, ‘‘race,’’ feminism, and gender studies.

5 units, Spr (Parker)

395A. Philosophical Reading Group — Close reading of classical and contemporary texts from the western philosophical tradition.

2-3 units, Aut, Win, Spr (Gumbrecht)

Th 7:30-10 p.m.

397. Contemporary Latin America: A Critical View — (Enroll in Latin American Studies 305, Spanish and Portuguese 397.) Critical analysis of contemporary issues in Latin America, as seen by leading writers, artists, and other intellectuals. Limited enrollment. Prerequisite: consent of instructor by application at Bolivar House.

3-5 units, Spr (Galeano)

625A,B,C. Topics in Arabic Literature and Culture — (Enroll in Linguistics 625A,B,C.) Designed as a sequence, but may be taken independently.

625A. Influences and Issues in Contemporary Arabic Literature — Introduction to key forms of modern Arabic literature. Survey of different genres (i.e., poetry, novels, essays, short stories) providing a glimpse at Arab society and culture. Readings include literary
works dealing with such dominant cultural topics as nationalism, religion, gender and women issues, kinship and social concepts. DR:2‡ or 7‡(2)
4 units, Aut (Barhoum)

625B. Contemporary Arab Writers—Samples of contemporary writings by influential Arab authors. Analysis of creative and cultural factors shaping the literary conceptions and works of each writer. Emphasis on texts that accentuate cultural and historical turning points in the collective experience of the modern Arab world. DR:2‡ or 7‡(2)
4 units, Win (Barhoum)

625C. The Arab World through Travel Literature—Early colonialist and post-colonialist portrayals of Arab culture in the West. Recent critical examinations of such stereotypical depictions of Arabs and Islam. DR:2‡ or 7‡(2)
4 units, Spr (Barhoum)

PROGRAM IN CULTURES, IDEAS, AND VALUES (CIV)

Program Director: Paul Seaver (Professor of History)

The Cultures, Ideas, and Values requirement is part of the system of Distribution Requirements instituted in 1980–81. Entering students must complete a three-quarter sequence, or track, expressly designed to introduce them to major works and historical movements in our heritage. Although the nine current tracks that constitute the CIV program are sponsored by different departments and programs, they share common readings, ensuring that all students are exposed to certain great works.

The sequences have different formats, but in addition to the common readings they share another important feature. Each sequence provides at least two hours per week of small group instruction with an experienced teacher.

Students are encouraged to fulfill the CIV requirement during the freshman year; however, some students may choose to defer it. Since the sequences do not all proceed at the same pace or cover the material in the same order, students must complete one entire sequence to satisfy the CIV portion of the Distribution Requirements. The following courses are available in 1994–95 and are organized to accommodate all entering freshmen and transfer students. Every effort is made to assign students to the specific courses they elect, but it is not possible to place all students in the courses they list as first choice.

TRACKS

STRUCTURED LIBERAL EDUCATION

Track Chair: Mark Mancall (Professor of History)

The program in Structured Liberal Education is also designated as a CIV sequence. For details, see the "Program in Structured Liberal Education" section of this bulletin.

"GREAT WORKS"

Track Coordinator: Cheryl Ross

This sequence focuses on works of literature, religion, philosophy, and political theory from European and non-European traditions that have contributed to contemporary America's cultural heritage. Canon formation is a major theme. Students learn about the different historical, political, and cultural processes that constitute "great works." A one-hour weekly lecture given by an expert in the field introduces the week's reading. The texts are explored in depth in four hours of weekly discussion seminars, guided by scholars from a variety of disciplinary backgrounds.

1. Ancient and Classical Cultures—Writings from Hebrew, Greek, Roman, and early Christian cultures, juxtaposed with major works of ancient China. DR:1 (three-quarter sequence)
5 units, Aut (Staff)

2. From the Middle Ages to the European Enlightenment—Literary, religious, philosophical, and political writings of the Medieval, Renaissance, Reformation, and Enlightenment periods in Europe, coupled with the writings of medieval Islam. DR:1 (three-quarter sequence)
5 units, Win (Staff)

3. From the Romantic Period to the Present—Works of political and social theory, literature, and philosophy from the late 18th through the 20th centuries, concluding with modern American responses to European and other traditions. DR:1 (three-quarter sequence)
5 units, Spr (Staff)

EUROPE AND THE AMERICAS

Track Chair: Mary L. Pratt, Professor of Spanish and Comparative Literature

Taught by faculty in literature, cultural studies, and anthropology, this track focuses on the Americas from pre-Columbian times through the period of European colonialism to the present. European classics are studied in terms of their relation to European contact with Asian, African, and Native American cultures. How culture is constructed through migration, commercial contact, conquest, colonization, slavery, and
Immigration. How do groups in contact borrow and lend their knowledge, wisdom, and everyday ways of life? How are relations of power expressed in cultural terms? Artists and intellectuals are studied as interpreters and transformers of cultural relationships. Students are encouraged to think critically about differing concepts of culture rather than assuming any one view. Two lectures plus three hours of small group discussion per week.

4. Imagining America: Writing the New World — Early representations of the Americas by Europeans, and of Europeans by indigenous Americans; myths of America as utopia, and critiques of notions of the self and the nation to which such myths give rise in political, historical, literary, and mass media forms (including film and popular music). DR: 1 (three-quarter sequence)

5 units, Aut (Pratt) lecture TTh 10

5. Destiny, Nations, and Destinations — Notions of fate and destiny are an integral part of the world. “It was meant to be” is one of the common phrases that comes out of religious, cultural, and social traditions of destiny. The Hebrew Bible, the Christian New Testament, Greek philosophy, mysticism, Asian religious discourses, and American Indian literature show how fate and destiny have been understood in the Americas and in Europe. Readings of 19th-century American literature, African-American literature, and Latin American liberation theology help understand how ideas of destiny and predestination have shaped contemporary culture. DR: 1 (three quarter sequence)

5 units, Win (Warrior) lecture TTh 10

6. Culture, Expression, and the Self — The differing conceptions of the self and the self in history, and different modes of representing selfhood in different cultures, e.g., fiction, social theory, autobiography, myth, and song. DR: 1 (three-quarter sequence)

5 units, Spr (Rosaldo) lecture TTh 10

EUROPE: FROM ANTIQUITY TO THE PRESENT

Track Chair: Carolyn Lougee (Professor of History)

(Enroll in History 1, 2, 3.) The sequence examines works of literature, philosophy, and art in their social, political, and economic settings. The focus is on the origins and evolution of medieval Europe, the relationship between European and other cultures, the Middle Ages and the Renaissance, the consolidation of the European state system, the intellectual and social innovations that emerged in the Enlightenment and in modern industrial societies, the evolution of democracies, and the global consequences of European and American developments. Students meet three hours a week with lecturers from the regular History faculty and two hours a week in small discussion sections led by postdoctoral fellows. Two sections of History 2 and 3 fulfill both the CIV requirement and the University Writing Requirement. Students in those sections meet for an additional two hours of writing instruction per week and receive 3 additional units of credit. DR: 1 (three-quarter sequence)

5 units, Aut, Win, Spr, MTW 9 plus section
8 units, Win, Spr for students in History/Freshman Writing sections

LITERATURE AND THE ARTS

Track Chair: David Riggs (Professor of English)

(Enroll in English 7, 8, 9.) A Cultures, Ideas, and Values (CIV) sequence paired with special sections of Writing and Critical Thinking. The sequence emphasizes literature, writing, and the creative imagination. Lectures explore literature in its cultural context and include sessions on art, architecture, music, and drama, moving chronologically from antiquity to the present and 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. Seminar instructors are experienced writing teachers, and student essays receive close attention. Writing seminars use a careful reading of the CIV 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 CIV requirement. Each student must enroll 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’s 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 CIV and Writing requirements.

7, 7A. Antiquity and the Middle Ages — From Gilgamesh and the Hebrew Bible to the dawn of the Renaissance, covering works including Homer, classical sculpture, Plato, Virgil, Roman architecture, Confucius, the New Testament, Sung landscape painting, Marie de France, the Popol Vuh, Giotto, and Chaucer. Writing instruction concentrates on critical
thinking, organization, and technical proficiency. DR:1 (three-quarter sequence)

5–8 units, Aut (Steidle, Staff) lectures plus sections and workshops

8,8A,8B,8C. Renaissance and Enlightenment — Readings from the Renaissance to the Enlightenment, including works by Machiavelli, More, painters of the Italian and the Northern Renaissance, Bach, Shakespeare, Donne, Milton, Defoe, Swift, Mozart, Rousseau, Mary Wollstonecraft, Paine, Jefferson, and Madison. Writing instruction concentrates on style and diction and on preparing and writing a research paper. DR:1 (three-quarter sequence)

5–8 units, Win (Riggs, Staff) lectures plus sections and workshops

9,9B,9C. The Modern World — Thought and literature from the French Revolution to contemporary times, including works by Romantic, Victorian, Modernist, and Postcolonial writers in English; selections from Marx and Freud; art from European and African traditions; film and Jazz. DR:1 (three-quarter sequence)

5–8 units, Spr (Trainer, Staff) lectures plus sections and workshops

LITERATURE AND THE HISTORY OF IDEAS

Track Chair: Paul Robinson (Professor of History)

(Enroll in Humanities 61,62,63.) This interdisciplinary sequence, offered by Humanities Special Programs, has been taught at Stanford continuously for more than 40 years. It emphasizes the interconnection of literature, the arts, philosophy, and social thought from the ancient to the contemporary world. Also examined are non-European cultural traditions. Three lectures per week by faculty from various departments plus two-hour discussion seminar per week led by postdoctoral lecturers or advanced doctoral candidates in the Humanities Program. DR:1 (three-quarter sequence)

5 units, Aut (McCall, Staff) lecture MWF 11
Win (Evan, Staff) lecture MWF 11
Spr (Harvey, Staff)
lecture MWF 11
plus two-hour discussion seminar

MYTH AND MODERNITY

Track Chair: Russell A. Berman (Professor of German Studies and Comparative Literature)

(Enroll in Classics 7A, German Studies 8A, 9A.) The sequence examines myth and narrative as central structures of meaning in traditional and contemporary societies, introducing fundamental problems in cultural interpretation, and encouraging a critical rethinking of cultural assumptions by juxtaposing ancient and modern material, and European and non-European texts. Texts are drawn from philosophy, literature, and the arts, including film and music. Each week, an expert gives a lecture on the material, which is then explored at length in discussion sections.

7A. Literature — Representations and competing versions of three key myths: origins, motherhood and matriarchy, and salvation. DR:1 (three-quarter sequence)

5 units, Aut (Stephens, Maurizio, Gleason) lec T 11 plus section

8A. Logos — The problem of the enlightenment as conceptual thought between reason and terror, the costs of progress and generational conflict, knowledge and violence, the discontent with theory. Readings from Plato, Kant, Schiller, Hegel, Marx, Nietzsche, Freud, Kafka, Mann. DR:1 (three-quarter sequence)

5 units, Win (Berman) T 11 plus section

9A. Language — The development of the modern understanding of language and the ways in which language, thought, and culture are interwoven; the origins of language; rhetoric, narrative, and poetry; intercultural translation; communication and power. Readings from Aristotle, Hobbes, Humboldt, Coleridge, Adorno, Foucault. DR:1 (three-quarter sequence)

5 units, Spr (Mueller-Vollmer, Robinson) T 11 plus section

ORIGINS, ENCOUNTERS, AND IDENTITIES

Track Chair: James A. Fox

8,9,10. Origins, Encounters, Identities — (Enroll in Anthropology 8,9,10.) This sequence fulfills the Cultures, Ideas, and Values 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.

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. DR:1 (three-quarter sequence)

5 units, Aut (Fox)

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 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 changed from those of the Renaissance during the Enlightenment and under 19th-century liberalism, and in the legacy and experience of California’s populations. 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. DR:1 (three-quarter sequence)

5 units, Spr (Yanagisako)

PHILOSOPHY AND HUMAN EXISTENCE
Track Chair: P. J. Ivanhoe (Assistant Professor of Philosophy and Religious Studies)

(Enroll in Philosophy 5A,B,C.) The sequence, developed by the Department of Philosophy and the School of Education, examines some of the philosophical roots of our culture. Each week there are two large-group lectures by regular faculty and two 90-minute discussion seminars taught by postdoctoral scholars to groups of fewer than 20 students. The aim is to encourage students to rethink some of the fundamental assumptions, prejudices, and values that have shaped them. Themes include the nature of morality, justice, evil, gender, race, freedom, ideology, and scientific knowledge. Autumn Quarter: the classical foundations of Chinese and Greek philosophic traditions. Winter Quarter: the limits of rational and scientific understanding, the philosophic basis of modern liberal democratic society, and the problems posed by evil to such understanding and/or social formations. Spring Quarter: 19th- and 20th-century conceptions of the problems and possibilities of human life in the light of apparent breakdowns in religion, morality and society, and the increasing intellectual dominance of science. Encourages students to think critically, and stresses the ability to analyze arguments carefully and to articulate those analyses in writing. DR:1 (three-quarter sequence)

5 units, Aut, Win, Spr, MW 9 plus discussion seminars

TECHNOLOGY AND CULTURE
(Enroll in Science, Technology, and Society 1,2,3.) This sequence, taught by the interdisciplinary faculty of the STS program, treats science and technology in their interaction with philosophy, literature, politics, and art as essential parts of our common cultural heritage. Beginning with the prehistoric world, traces the interconnections among intellectual, material, and social conditions into the age of computers, space travel, and genetic engineering.

1. Technology in the cultures of antiquity: Mesopotamia and Egypt, ancient Israel, the classical civilizations of Greece and Rome, the contributions of China and Islam. DR:1 (three-quarter sequence)

5 units (Staff) given 1995–96

2. The consolidation of the scientific worldview in the west from the Middle Ages through the Scientific and Industrial Revolutions. Readings from Leonardo da Vinci, Shakespeare, Galileo, Mary Shelley, and others. DR:1 (three-quarter sequence)

5 units (Staff) given 1995–96

3. The interdependence of technology and culture in the 20th century. Topics: personal life, war and peace, the environment, and the transformations of social life in modern America. DR:1 (three-quarter sequence)

5 units (Staff) given 1995–96

DRAMA
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. **Acting:** any acting course except 29.
2. **Literature and Criticism:** 151, 152, and 153, plus three other classes in theater history or dramatic literature.
3. **Design and Production:** a minimum of 2 units of 31, 32, and 33, plus 130.
4. **134,** Stage Management.
5. **Performance:** each major must complete a minimum of 8 units in laboratory courses in departmental theater productions to be divided as follows: a minimum of 2 units in 29, 39A, 39B, and 39C. Students are encouraged to satisfy these required units early in the major.
6. **Electives:** a program of 15 units of elective courses to be worked out in consultation with the major adviser.
7. **Senior Project:** every Drama major must complete an approved Senior Project, a minimum of 2 units in 200.

Two years of a college-level foreign language are strongly recommended.

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 may do a senior project in one of the following areas: Acting; Directing; Design or Technical Production; Dramatic Literature, Criticism, or Theater History; or an individually designed program. 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. For a Senior Project to be approved, students must have taken prerequisite Drama courses in certain areas:

1. **Acting:**
   a) The student must have completed six courses in acting, including 120A, B and one movement class.
   b) The student must have completed at least 2 units of 29 and acted in at least two department productions.
   c) Approved Senior Projects in Acting: students usually perform major roles in departmental productions produced in the senior year. If no suitable production in the season is available, the student may design an appropriate project or performance.

2. **Directing:**
   a) The student must have completed three courses in acting as well as 170, Directing, and 134, Stage Management.
   b) The student must have completed at least 4 units of 29 or 39A, 39B, or 39C, thereby participating in some aspect of at least two department productions.
   c) Approved Senior Projects in Directing: the student is assisted in securing a production slot somewhere on campus during his or her senior year. The student must submit for approval a production plan that includes play selection, budget, schedule, staff assignments, and a brief statement of concept and casting procedures. An integral part of the directing project is to administer all aspects of the production. To properly prepare this production plan, the student should consult early and frequently with the Department of Drama technical director. The department supplies materials, supervision, and staff
as available to assist the production. In addition to directing the production, the student must submit a copy of the prompt book to the adviser.

3. Design or Technical Production (D/TP):
   a) The student must have completed four courses in Design or Technical Production: 31, 32, and 33, and a 130-level course in the project’s specific area.
   b) The student must have completed at least 4 units of 39A, B, or C and participated in some technical or design aspect of at least two department productions.
   c) Approved Senior Projects in Design or Technical Production: on recommendation of the production committee, the student is assigned design or production responsibility (lighting design, scenery design, costume design, or stage management) for a major Department of Drama production produced in the senior year. If no suitable production in the main season is available, the student may design a project with the assistance of the Design and Technical Production faculty.

4. Dramatic Literature, Criticism, or Theater History:
   a) The student must have taken three courses in dramatic literature at the 100 level, one of which may be from another department; Drama 160 or 161, theater history; and Drama 151, 152, and 153.
   b) Approved Senior Projects in Dramatic Literature, Criticism, or Theater History: the student must submit a research proposal with the endorsement of an adviser from the Drama faculty. The completed senior essay must be submitted to the adviser no later than the first week of the final quarter before graduation.

HONORS PROGRAMS

DRA MA

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 an average letter grade indicator (LGI) of ‘B+’ including all the student’s work in Drama.
3. The student must have completed prerequisite courses in the Senior Project’s area of specialty with an LGI 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 “Advanced Degrees” section of this bulletin. The following department requirements are in addition to the University’s basic requirements for the doctorate.

For further information, please write to the Department of Drama, Memorial Auditorium M144, Stanford, CA 94305-5010 or telephone 415-723-2576. The FAX number is 415-723-0843.

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, directing, or aesthetic theory. One of them must
be in theater history, 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 an LGI 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.

COMPREHENSIVE EXAMINATIONS

Candidates must complete three examinations, one by the end of each of the first three years of study. Each student is to submit a critical bibliography to his or her adviser for approval the quarter before the quarter in which the examination is taken.

Students are urged to take examinations as early in the quarter as possible. Examinations play an important role in the annual review of a student's progress toward the degree. The first examination must be taken by the end of the first year of residence; the second examination must be taken by the end of the second year of residence (and before advancement to candidacy); the third examination must be taken by the end of the third year of residence (and before the submission of the dissertation prospectus).

Examinations are offered annually in each of the following periods of dramatic literature:

Classical
Medieval and Renaissance
Neoclassical
Romantic and Early Realistic
Modern, 1870-1956
Contemporary, 1956 to the present

Students are required to take three examinations in different historical periods chosen in consultation with an adviser from the Graduate Studies Committee.

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), four seminars (including one in the Department of Drama), and the directing workshop series (370-374)

2. A foreign language

3. At least two 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 department's 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.

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 candidate 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. 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 January 1, 1995.

The Department of Drama awards a number of fellowships to students in the Ph.D. program.

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.

COURSES

A special brochure is available providing full details of courses given in the Summer Quarter.

INTRODUCTORY

2. Introduction to Theater — Lecture introducing students to the theater and various specialties of the discipline that contribute to the final theatrical event.
   3 units, Win (Eddelman) MWF 9

20. Basic Approaches to Acting — 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) MW 10-11:50 or TTh 1:15-3:05

27. Musical Theater Workshop — (Same as Dance 65.)
   2 units, Win (Cashion)

29. Theater Performance: Acting — 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) by arrangement

31. Stage Lighting Design Practicum — Lab introducing the practical skills used in the production of stage lighting.
   1 unit, any quarter (Ramsaur) by arrangement

32. Stage Costume Design Practicum — Lab introducing the practical skills used in the production of stage costumes.
   1 unit, any quarter (Strayer) by arrangement

33. Stage Scenery and Props Practicum — Lab introducing various practical skills such as wood-working, metal-working, and scene painting used in the production of stage scenery.
   1 unit, any quarter (Stewart) by arrangement

34. Stage Management Techniques — Survey lecture introducing the production process and the wide variety of duties and responsibilities of a stage manager.
   2 units, Win (Stewart) MWF 10

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. Majors must take 2 units in each area.
   1-3 units, any quarter (Staff) by arrangement

39A. Scenery and/or Property
39B. Lighting and/or Sound
39C. Costumes and/or Make-up

50. Introduction to Drama — (Same as English 40.) Principal dramatic forms, development of dramatic art, masterpieces of the theater from various periods, countries. DR:7(2)
   3 units, Spr (L'Heureux) MTWTh 10

53. Greek Tragedy — (Same as Classics/Greek 12.)
   DR:7(2)
   3-5 units, Win (McCall)

54. Themes of Sexual Identity in Drama — Survey of gay/lesbian/queer drama: representative plays, historical context, and related criticism.
   4 units, Aut (Capri, McGurl) MW 10-11:50

59. Shakespeare — (Same as English 73.) For the general student and the prospective English major. Reading of representative comedies, histories, and tragedies. DR:7(2)
   3 units, Aut (Lyons) TTh 1:15-3:05

65. American Musical Theater — Survey of the development of the American musical theater (1850s to the present) as a unique and indigenous art form and as an expression of cultural changes in American society. Slides, recordings, and films.
   3 units, Aut (Eddelman) MWF 9

INTERMEDIATE

Primarily for the major but open to all undergraduates who have the necessary prerequisites.

103. Improvisation — Improvisational theater games teach spontaneity, cooperation, team building, and problem solving “on one’s feet.” Emphasis is on 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, Win (Ryan) MWF 1:15-3:05
113A,B. **Group Communication** — Focuses on inter-personal processes of communication as they relate to inter-group experience.

- 4 units, Win, Spr (Schrader) TTh 2:15-4:05

120A,B. **Acting Techniques** — For the student who intends to begin serious actor training. First quarter emphasizes technique in playing an objective. Working improvisationally, the actor learns to enter the stage for a purpose and play an objective in the face of obstacles. Physical and vocal warmups. Second quarter: actor learns to approach a realistic text, moving from a basic knowledge of action and intention to bringing the text alive. Researching a role, developing a character’s biography, and playing truthfully. Basic Method exercises are balanced with kinetic work. T’ai Chi Chuan is taught as the warmup. Read plays and attend performances. Two-quarter course must be taken in sequence.

- 120A. 3 units, Aut (Ryan) MW 10-12
- 120B. Prerequisite: 120A or consent of instructor.

- 3 units, Win (Ryan) MW 10-12

121. **Scene Work** — For actors who complete substantial scene work with graduate directors in the Graduate Directing Workshop during any quarter.

- 1-2 units, any quarter (Staff)

125A. **Audition Techniques** — Recommended for students seeking the department’s nomination for the URTA national auditions. Designed to help prepare seniors for URTA and other graduate training auditions. Emphasis is on finding and rehearsing suitable monologues and developing a portfolio of short performance pieces to be used as audition material and advice for cold readings and in the preparation of a resume.

- 3 units, Aut (Ryan) M 2:15-5:05

125B. **Comedy Techniques** — Working on acting problems related to the genre of comedy. Prerequisite: 120A,B or equivalent.

- 3 units, Win (Staff) TTh 3:15-5:05

125C. **Shakespeare Techniques** — Working on acting problems related to the performance of Shakespeare. Prerequisite: 120A,B or equivalent.

- 3 units, Spr (Staff) TTh 3:15-5:05

127A. **Dance History and Philosophy** — (Same as Dance 160A.) Historical lecture/survey of Western theatrical dance, examining changing notions of gender construction and the body in dance over the last 400 years. Ballet and modern dance looked at in the context of social and political events and artistic developments and ideologies. DR:7τ(2)

- 3-4 units, Win (Ross) TTh 1:15-3:05


- DR:7τ(2)

- 3-4 units, Spr (Ross) TTh 1:15-3:05

129A. **Scene Study** — Project class for actors who wish to continue their training with scene work with faculty or graduate directors.

- 3 units, Aut (Elam) TTh 3:15-5:05

129B. **The Actor and Director** — Approaches to the actor/director relationship. Application of recent theories of language acquisition and use to acting problems. Development of exercises and rehearsal strategies that relate speech in the theater to contemporary notions of language use.

- 3 units, Win (Lyons) MW 3:15-5:05

129C. **Performance Lab** — Project class for actors working on a full-length play. Autumn: Shakespeare’s Romeo and Juliet and stage combat; Spring: Max Frisch’s Biedermann and the Firebugs.

- 3 units, Aut, Spr (Staff) MWF 3:15-5:05

129D. **Colloquium: Shakespeare Through Performance** — (Enroll in English 273.)

- 4-5 units, Aut (Friedlander) Th 3:15-6:05

130. **Introduction to Theatrical Design** — Lecture/lab introducing basic skills of visual communication used in producing stage productions. Covers design and construction methods for stage scenery, costumes, and lighting.

- 5 units, Aut, Spr (Ramsaur, Stewart, Strayer) MTWTh 11 plus lab by arrangement

131. **Lighting Design** — Lecture/lab dealing with all 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: 130 or consent of instructor.

- 3 units, Aut (Ramsaur) MW 3:15-5:05

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: 130 or consent of instructor.

- 3 units, Win (Staff) MW 3:15-5:05

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: 130, or consent of instructor.

- 3 units, Spr (Staff) MW 3:15-5:05

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 design, costume design, lighting design, 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) by arrangement

140. Playwriting — Introduction to the essentials of playwriting through exercises leading to the completion of a one-act play.

5 units, Spr (Smith) MW 2:15-4:05

151. Performance and the Body Politic — Three historical moments in which theatrical performance, as a civic event, brought the citizens of a community together in the formation, reinforcement, or examination of a system of belief that was integral to the religious, political, and social organization of that community. Topics: festival performances of tragedy in 5th-century Athens, the Corpus Christi cycle plays of medieval Britain, and the contemporary traveling Yoruba drama of Nigeria that bases itself on traditional modes of African performance. The processes by which festival production incorporates, revises, and extends material from myth (or institutionalized systems of belief) to enact ideologically shaped relationships among individual, state, and the cosmos. DR: 7(2)

4 units, Aut (Elam, Lyons, Rehm) TTh 10-11:50

152. Performance and the Body — How drama has represented the human body and how the body on stage reveals assumptions, norms, ideals, politics, and dissonance in a culture. Using texts, performance accounts, and non-dramatic readings, compare how the body has been used as an instrument, image, and metaphor. Readings from Euripides, Sophocles, Plato, Theophrastus, Shakespeare, Rousseau, Nietzsche, Artaud, Büchner, Kleist, Bakhtin, Wilson. DR: 7(2)

4 units, Win (Rayner) TTh 10-11:50

153. Performance and the Mind — The ways in which theatrical performance has constructed images of the human mind within schemes of moral choice, rationality, inspiration or ecstasy, or madness. Relating the staged representation of the mind to the philosophical concepts of the self that operated at the moment of original production. Plays: Sophocles' Ajax, Euripides' Hippolytus and Herakles, Marlowe's Dr. Faustus, Shakespeare's King Lear, John Webster's Duchess of Malfi, Ibsen's Hedda Gabler, Pirandello's Enrico IV, Brecht's A Man's A Man and The Measures Taken, Beckett's Not I and Rockaby, and Heiner Müller's Hamletmachine. DR: 7(2)

4 units, Spr (Lyons, Rehm) TTh 10-11:50

154. 20th-Century American Theater — American drama and theater from the beginning of the 20th century to the present, focusing on elements of theater history and design and the plays of O'Neill, Williams, Miller, Albee, and others.

4 units, Spr (Cole) MWF 1:15

154C. Technology and Narratives of Identity — Film, plays, and theory in contemporary psychoanalytic, feminist, and phenomenological discourses as technology has disrupted the Oedipal narrative and required a re-evaluation of issues of domination, identity, and gender.

4 units, Spr (Rayner) TTh 1:15-3:05

156. Contemporary Ethnic Drama — The dramaticity, i.e., thematic issues, styles, and aesthetics, of contemporary ethnic playwrights in the U.S., focusing on plays written from the 1960s to the present, emphasizing plays by women of color.

4 units, Spr (Elam) MWF 9

157. Contemporary Black Playwrights — The dramaticity, i.e., thematic issues, styles, and aesthetics, of contemporary playwrights in the U.S., the Caribbean, and Africa. The concept of an African Diaspora or cultural continuity between Africa and the Americas is the premise; also explores diversity among the various societies represented.

4 units (Elam) alternate years, given 1995-96

157M. El Sexto Sol: Latino/Chicano Teatro for the Next Millennium — Writing for Performance course. Students develop their own original material to be performed by class members. Through playwriting and acting exercises, including dramatic monologue and scenework, docu-drama,agit-prop, teatropoesia, and oral histories, students help create new Latino theater for the 21st century.

4 units, Aut (Moraga) TTh 2:15-4:05

158B. Bertolt Brecht — The theory and practice of Bertolt Brecht. Brecht's work as a playwright and director in the context of the historical moment that informed Brecht's writing and directing from WWI to the "Cold War" of the 1950s.

3 units, Win (Weber) TTh 1:15

159A,B,C. Shakespeare — (Enroll in English 173A,B,C)

159A. 5 units, Aut (Friedlander)
159B. 5 units, Win (Orgel)
159C. 5 units, Spr (Parker)

170. Introduction to Directing — Prerequisite: consent of instructor.

4 units, Aut (Rehm) TTh 1:15-3:05

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.

1-4 units, Win (Staff) by arrangement

180A. Peters Seminar: Performance and Society: How Societies Use Performance in Defining their Identity — For sophomores only. The ways
performance has been created by, and responded to, societal developments throughout history. Prerequisite: one course in history or the arts.

3-4 units, Win (Weber) W 3:15-6:05

180B. Peters Seminar: Noam Chomsky: The Drama of Resistance — For sophomores only. Focuses on the ideas and work of Noam Chomsky, who challenged 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.

4 units, Spr (Rehm) W 2:15-5:05

190. Special Research — Individual project in the work of a playwright, period, or genre. Prerequisite: consent of instructor.

1-5 units, any quarter (Staff) by arrangement

191. Independent Research — Individual supervision of off-campus internship. Prerequisite: consent of instructor.

1-18 units, any quarter (Staff) by arrangement

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 for those who have taken 103. The class functions as a company, doing performances and teaching workshops in improvisation for dorms and other groups.

3 units (Ryan)

alternate years, given 1995-96

213. Advanced Improvisation Group — For members of the improv troupe only. Special project work.

1-2 units, Aut, Win (Ryan) by arrangement

220A,B. Advanced Performance Workshop — 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; both quarters required. Prerequisites: audition and consent of instructor.

220A. 5 units, Win (Ryan) MWTh 3:15-5:45

220B. 5 units, Spr (Smith) MWTh 3:15-5:45


4 units, Aut (Elam, Lyons, Rehm)

252. Performance and the Body — See 152.

4 units, Win (Rayner)


4 units, Spr (Lyons, Rehm)

254. 20th-Century American Theater — See 154.

4 units, Spr (Cole)

254C. Technology and Narratives of Identity — See 154C.

4 units, Spr (Rayner)

256. Contemporary Ethnic Drama — See 156.

4 units, Spr (Elam)

258B. Bertolt Brecht — See 158B.

3 units, Win (Weber)

290. Special Research — Individual project on the work of a playwright, period, or genre.

1-5 units, any quarter (Staff) by arrangement

GRADUATE

For graduates; open to advanced undergraduates with consent of instructor.


3-5 units, Aut (Rayner) TTh 1:15-3:05

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) MW 10-12

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) by arrangement

311. Seminar: Classical Period — Texts from Homer through the Greek tragedians of the 5th Century.

3-5 units, Spr (Rehm) TTh 4:15-6:05

353. Seminar: The Body in Performance — Graduate seminar in conjunction with 152 focusing on how theater institutes a history of the body, how and whether the body can be written, and what constitutes its performance.

3-5 units, Win (Rayner) TTh 1:15-3:05

360. Seminar: Topics in Theater History — Classical Greece to the Beginning of the 19th Century — The stylistic evolution of theaters and stag
ing 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, Aut (Eddelman) MW 1:15-3:05

361. Seminar: Topics in Theater History — 1800 to the 1970s — Emphasis is on innovation and experimentation as it developed in European and American theater, focusing on the aesthetic theories behind early Realism, Naturalism, Appia, Craig, the "isms," and scenography created by artists.

3-5 units, any quarter (Weber) by arrangement

362. Seminar: Directing and Dramaturgy — Discussion/application of dramaturgy, directorial methods, and visual concepts in plays from the Elizabethan tradition to Post-Modernist texts. Work on the text is tested in the staging of scenes.

3-5 units, any quarter (Weber) by arrangement

364. Graduate Directors Performance Project — Production of a full-length play selected in consultation with faculty. Project is designed by the 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 (Weber) by arrangement

375. Seminar: Directing and Dramaturgy — Discussion/application of dramaturgy, directorial methods, and visual concepts in plays from the Elizabethan tradition to Post-Modernist texts. Work on the text is tested in the staging of scenes.

3-5 units, any quarter (Weber) by arrangement

376. Graduate Directors' Dramaturgy Project — Serving as a dramaturg on any departmental production. Work includes research on the production's text source, the writing of program notes, and the compilation and editing of the playbill. Possible adapting/editing of the performance text, and translating text from a foreign language.

2 units, any quarter (Weber) by arrangement

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 (Weber) by arrangement

390. Tutorial

1-9 units, any quarter (Staff) by arrangement

399. Dissertation Research

1-9 units, any quarter (Staff) by arrangement

OVERSEAS STUDIES

157E. Black Theater in England — Oxford. DR:7(2)

4 units, Win (Elam)

158C. An Introduction to Modern German Cinema — (Same as German Studies 134B.) Berlin.

4 units, Win (Rehm)

158J. Jacobean Drama 1600-1642 — Oxford. DR:7(2)

4 units, Win (Elam)

158N. Weimar Culture: Theater and Film — Berlin.

4 units, Spr (Eddelman)

158S. Theater and Society — (Same as Latin American Studies 127X.) Santiago.

5 units, Au (Hurtado)

158T. Greek Tragedy and German Culture: An Artistic Symbiosis — (Same as German Studies 174B.) Berlin.

4 units, Win (Rehm)

258W. CD ROM and Cultural Reconstructions — Berlin.

4 units, Spr (Eddelman)
EAST ASIAN STUDIES

Director: Susan Matisoff
Assistant Director: Theodore N. Foss
Affiliated Faculty:
Art: 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, Yingyi Qian, Homou Wu (Visiting)
Education: Thomas Kohlen
Food Research Institute: Scott D. Rozelle
History: Gordon Chang, Peter Duus, Harold L. Kahn, James E. Ketelaar, Jeffrey P. Mass, Ellen Neskar, Lyman P. Van Slyke
Law: Victor Hao Li
Linguistics: William J. Poser (on leave), Peter Sells
Philosophy: Philip J. Ivanhoe, David S. Nivison (emeritus)
Political Science: Nobutaka Ike (emeritus), John W. Lewis, Robert North (emeritus), Daniel Okimoto, Kurt Steiner (emeritus), Robert E. Ward (emeritus)
Religious Studies: Carl Bielefeldt, Bernard Faure, Philip J. Ivanhoe, David S. Nivison (emeritus), Lee H. Yearley
In addition, a number of other Stanford faculty have some teaching or research interests related to East Asia: Takeshi Amemiya (Economics), Barton Bernstein (History), Chen Fumei (Hoover Institution), Henri-Claude de Bettignies (Business), Walter P. Falcon (Food Research), William B. Gould (Law), Thomas Metzger (Hoover Institution), David Montgomery (Business), Ramon Myers (Hoover Institution), Evan Porteus (Business), Sylvia Yanagisako (Anthropology), Pan A. Yotopoulos (Food Research)

The Center for East Asian Studies coordinates all University instructional, research, and special activities related to China and Japan. 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 China and Japan with civic groups, secondary schools, and local colleges in the San Francisco Bay Area. The Stanford East Asia National Resource Center 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, Room 14, Littlefield Center, Stanford University, Stanford, California 94305; telephone 415-723-3362.

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. Alternatives include a major in Chinese or Japanese within the Department of Asian Languages, an informal concentration on China or Japan within a regular departmental major, and such other interdisciplinary majors as International Relations.

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 treating China and/or Japan. Courses to be credited toward major requirements must be completed with a letter grade indicator (LGI) of ‘C’ or better. These units are to be distributed as follows:

1. Language: 30 units – completion of at least first- and second-year courses in either Chinese or Japanese 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: 15 units — completion of at least one of the following course sequences:
   - History 192A, 192B, 192C (Chinese History)
   - History 194A, 194B, 194C (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, but literature courses and additional courses in history may be counted. 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 Ming-Qing China
   - Culture and society of modern Japan

4. Senior Essay: completion of a paper of approximately 25 typewritten pages 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.

HONORS PROGRAM

 Majors with an LGI 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 40 typewritten pages 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 11th 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

THEME HOUSE

 EAST 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 China and Japan. 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 in Kyoto, offers an academic quarter focused on Japanese organizations and the political economy of research, development, and production of high technology and advanced industries followed by an internship in a Japanese firm, laboratory, or agency. For information about either program, students should contact the Overseas Studies office in Sweet Hall.

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 may shorten this time by receiving credit for prior language work or by attending summer sessions. Because of the limited availability of the center’s financial resources, students admitted to this program with aid 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 the first three years of language training in either Chinese or Japanese. Students entering the program without any language preparation should complete 30 units of Chinese or Japanese (first- and second-year) 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 receiving credit for courses taken at other institutions. Students who fulfill the 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. Graduate language courses 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 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 also petition to have this 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 and totaling at least 37 units beyond the courses used to fulfill the third-year-level language requirement. (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 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. The master’s paper, representing a substantial piece of research, should be filed with the center’s program office as part of the graduation requirements. The six additional area courses may be taken in departments of the students’ 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.

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.

RELATED PROGRAMS

Qualified graduate students may apply for A.M. degrees within the Food Research Institute and the School of Medicine.

EAST ASIAN STUDIES AND FOOD RESEARCH

An A.M. degree may be awarded by the Food Research Institute to students who complete 25 units of work in the institute with a letter grade indicator (LGI) of ‘B’ or better and at least 45 units of approved work in courses numbered 100 or above with a grade of ‘B’ or better. Course work is designed at the outset of the program to equip students with specific skills and is not encouraged for those desiring a Ph.D. from the Food Research Institute. Applications should be made to Chair, Graduate Instruction Committee, Food Research Institute, Encina Hall Stanford, CA 94305.

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 policymakers. Students completing 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, and the Food Research Institute. 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 the Stanford East Asia National Resource Center, Rm. 14, Littlefield Center, Stanford University, Stanford, California 94305-5013.

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.

14. Introduction to Chinese Society — (Same as Anthropology 114.)
   5 units, Win (Wolf) MWF 3:15

330. Core Seminar: Issues and Approaches in East Asian Studies
   1 unit, Aut (Staff) M 3:15

AFFILIATED DEPARTMENT OFFERINGS

ANTHROPOLOGY

14. Cultures in Crisis
   5 units (Befu) not given 1994-95
117. Society in Traditional China
  5 units, Win (Gates)

121. Japanese Society and Culture
  5 units, Spr (Befu)

123. Japanese Economic Organization
  5 units (Befu) not given 1994-95

125. Japanese Woman through Novels
  5 units (Befu) not given 1994-95

258. Ideology and Cultural Nationalism
  5 units, Aut (Befu)

ART

2. Ideas and Forms in Asian Art
  5 units, Win (Takeuchi)

126A/226A. Introduction to the Study of Chinese Painting
  4 units, Win (Vinograd)

126B/226B. Early Chinese Pictorial Art
  4 units (Vinograd) not given 1994-95

126C/226C. Artists and Systems in Later Chinese Painting
  4 units (Vinograd) not given 1994-95

126E/226E. Across Cultures: Encounters of Eastern and Western Art
  4 units (Vinograd) not given 1994-95

129/229. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868
  4 units (Takeuchi) not given 1994-95

129A/229A. Painting in Late Medieval and Early Modern Japan, 1500-1868
  4 units (Takeuchi) not given 1994-95

227/227A. Seminar: Painting and Theory in the Sung Dynasty
  4 units (Vinograd) not given 1994-95

227B. Seminar: Studies on 18th- and 19th-Century Chinese Painting
  4 units (Vinograd) not given 1994-95

229D. Seminar: Problems in Japanese Painting
  4 units (Takeuchi) not given 1994-95

229E. Colloquium: Japanese Woodblock Prints
  4 units (Takeuchi) not given 1994-95

229G. Colloquium: Women and Gender in Japanese Art
  4 units (Takeuchi) not given 1994-95

ASIAN LANGUAGES

46. Introduction to Chinese Thought — (Same as Philosophy 46, Religious Studies 55.)
  4 units, Spr (Ivanhoe)

51/151. Japanese Business Culture
  3 units, Win, Sum (Dasher)

91. Traditional East Asian Civilization: China
  5 units, Aut (Egan) TTh 9:30-11

92. Traditional East Asian Civilization: Japan —
  (Same as History 196.)
  5 units, Win (Hare) MWThF 2:15

113. Zhuang Zi — (Same as Philosophy 113, Religious Studies 113.)
  5 units (Ivanhoe) not given 1994-95

131. Chinese Poetry in Translation
  4 units, Aut (Liu) TTh 1:15-2:30

132. Chinese Fiction and Drama in Translation
  4 units, Win (Staff) MWF 1:15

133. Modern Chinese Literature in Translation
  4 units, Spr (Lyell)

134. Contemporary Chinese Fiction
  4 units (Lyell) not given 1994-95

135. Japanese Drama in Translation
  4 units, Aut (Matisoff) TTh 2:15-3:30

136. Japanese Poetry in Translation
  4 units, Aut (Staff) not given 1994-95

137. Japanese Fiction in Translation
  4 units (Matisoff) not given 1994-95

138. Modern Japanese Literature in Translation
  4 units, Spr (Staff) MWF 1:15

142. Constructing the Subject
  4 units (Hare) not given 1994-95

156. China from Earliest Times to the 9th Century — (Same as History 192A.)
  5 units, Aut (Neskar) MTWThF 11

181. Japanese Women Writers
  4 units (Matisoff) not given 1994-95

192S. Undergraduate Seminar: China in the Western Imagination, 16th-20th Century —
  (Same as History 292S.)
  5 units, Spr (Kahn) W 1:15-3:05

195. Modern Intellectuals in Japanese Literature
  3 units (Ueda) not given 1994-95

CHINESE

First-time registrants in a first- or second-year course must take a placement test if they have had any training in Chinese before entering Stanford.

1,2,3. First-Year Modern Chinese
  5 units, Aut, Win, Spr (Shou)
  MTWThF 10, 11, or 1:15

1B,2B,3B. First-Year Modern Chinese for Bilingual Students
  3 units, Aut, Win, Spr (Rozelle)
  MWF 10, 1:15, or 2:15
5. Intensive First-Year Modern Chinese
   8 units, Sum (Staff) MTWThF 8-12

7.8. Beginning Conversational Chinese
   2 units, Win, Spr (Staff) TTh 2:15

21,22,23. Second-Year Modern Chinese
   5 units, Aut, Win, Spr (Y. Wang)
   MTWThF 9 or 10

21B,22B,23B. Second-Year Modern Chinese for Bilingual Students
   3 units, Aut, Win, Spr (Y. Wang)
   MWF 12 or 2:15

25. Intensive Second-Year Modern Chinese
   8 units, Sum (Staff) MTWThF 8-12

27,28,29. Intermediate Chinese Conversation
   2 units, Aut, Win, Spr (Shou) TTh 2:15

51. Chinese Calligraphy
    1-2 units, Win, Spr (Chuang) TTh 2:15

CHINESE/ADVANCED

101,102,103. Third-Year (Modern) Chinese
   101. 5 units, Aut (Thai) MTWThF 11
   102. 5 units, Win (Thai) MTWThF 11
   103. 5 units, Spr (Thai) MTWThF 11

105. Intensive Modern Chinese
   8 units, Sum (Staff) MTWThF 9-12

121,122,123. Advanced Chinese Conversation
   2 units, Aut, Win, Spr (Chuang) W 2:15-4:05

131,132,133. Business and Legal Chinese
   3 units, Aut, Win, Spr (Staff) by arrangement

CHINESE/GRADUATE

200. Directed Reading in Chinese
    units by arrangement, Aut, Win, Spr (Staff)
    by arrangement

201. Proseminar
    5 units, Aut (Chen) W 2:15-4:05

211,212,213. Advanced Modern Chinese
   5 units, Aut, Win, Spr (Chuang)
   by arrangement

221,222,223. Advanced Classical Chinese

221. Philosophical Texts
    5 units, Aut (Ivanhoe) MWF 1:15

222. Historical Narration
    5 units, Win (Staff) TTh 11-12:15

223. Literary Essays
    5 units, Spr (Liu) TTh 2:15-3:05

230. Interpreting Confucian Texts—(Same as Philosophy 212, Religious Studies 212.)
    5 units, Spr (Ivanhoe) MW 2:15-4:05

231. Neo-Confucianism—(Same as Philosophy 114, Religious Studies 119A.)
    4 units (Ivanhoe) not given 1994-95

232. Philosophical Texts of the Ming Dynasty—
    (Same as Philosophy 211, Religious Studies 211.)
    5 units (Ivanhoe) not given 1994-95

241,242,243. Modern Chinese Literature

241. The Short Story
    5 units, Win (Lyell) MWF 10

242. Essay
    5 units, Spr (Chuang) MWF 10

243. The Novel
    5 units (Lyell) not given 1994-95

261. Shih-ching and Ch'u-tz'u
    4 units, not given 1994-95

262. Readings in Yueh-fu Poetry
    4 units, Spr (Egan) TTh 9:30-10:45

263. Lyric (shih) I
    4 units, Win (Liu) not given 1994-95

264. Lyric (shih) II
    4 units, Aut (Liu) MW 2:15-3:30

266. Songs and San-ch'u
    4 units, not given 1994-95

271/272. Traditional Chinese Fiction
    4 units (J. Wang) not given 1994-95

273. Chinese Drama
    4 units (J. Wang) not given 1994-95

291. The Structure of Modern Chinese—(Same as Linguistics 291.)
    4 units, Spr (Sun) TTh 1:15

292. The History of Chinese
    4 units (Sun) not given 1994-95

334. Seminar in Modern Chinese Literature
    5 units, Spr (Lyell) MW 2:15-3:30

361. Seminar on Tz'u Poetry of the Tang and Song
    5 units, not given 1994-95

371. Seminar in Chinese Literary Criticism
    5 units (J. Wang) not given 1994-95

JAPANESE

First-time registrants in a first- or second-year course must take a placement test if they have had any training in Japanese before entering Stanford.

1,2,3. First-Year Modern Japanese
   5 units, Aut, Win, Spr (Sakamoto, Staff)
   MTWThF 9, 10, 11, or 1:15

5. Intensive First-Year Modern Japanese
   12 units, Sum (Staff) MTWThF 8-12

   3 units, Aut, Win, Spr (Busbin)
   MWF 9, 11, or 1:15
17/117, 18/118, 19/119. Second-Year Japanese for Professionals
3 units, Aut, Win, Spr (Yagi) MWF 9 or 10

21, 22, 23. Second-Year Modern Japanese
5 units, Aut, Win, Spr (Nebrig, Staff)
MTWThF 9, 11, or 1:15

25. Intensive Second-Year Modern Japanese
12 units, Sum (Staff) MTWThF 8-12

27, 28, 29. Intermediate Japanese Conversation
2 units, Aut, Win, Spr (Kubo) TTh 2:15

130. Reading Technical Japanese
1-3 units, Sum (Dasher)

JAPaneSE/ADVANCED

101, 102, 103. Third-Year Modern Japanese
5 units, Aut (Arao) 11-12:20 or 12:45-2:05
Win, Spr (Arao) MWF 11-12:20

105. Intensive Third-Year Modern Japanese
12 units, Sum (Staff) MTWThF 9-12

3 units, Aut, Win, Spr (Yagi) MW 12:14-2:05

114. Japanese for Business
3 units, Sum (Staff) TTh 4-6

121, 122, 123. Advanced Japanese Conversation
2 units, Aut, Win, Spr (Kubo) TTh 1:15

JAPaneSE/GRADUATE

200. Directed Reading in Japanese
units by arrangement, Aut, Win, Spr (Staff)
by arrangement

201. Proseminar
5 units (Matisoff) not given 1994-95

208. Teaching Asian Languages — (Same as Linguistics 188.)
2 units, Win (Staff) by arrangement

211, 212, 213. Advanced Modern Japanese
5 units, Aut, Win, Spr (Matsumoto) MW 11-12:15
Spr (Kubo) MW 11-12:15

246. Introduction to Classical Japanese
5 units, Aut (Hare) by arrangement

247, 248. Readings in Classical Japanese
247. 5 units (Matisoff) not given 1994-95
248. 5 units, Win (Hare) by arrangement

250. Introduction to Kambun
4 units, Win (Ueda) TTh 2:15-3:30

251. Graduate Seminar: Japanese Historical Texts — (Same as History 498.)
4-5 units, Win (Mass) by arrangement

256. Readings in Japanese Culture
4 units (Staff) not given 1994-95

258. Japanese Buddhist Texts — (Same as Religious Studies 258.)
5 units, Spr (Bielefeldt) by arrangement

275. Canons and Conventions in Traditional Japanese Literature
4 units (Hare) not given 1994-95

277. The Structure of Japanese — (Same as Linguistics 177.)
4 units (Matsumoto) not given 1994-95

280. Medieval Japanese Narrative and Dramatic Literature
4 units, Spr (Matisoff) TTh 2:15-3:30

281. Japanese Pragmatics — (Same as Linguistics 281.)
4 units, Aut (Matsumoto) MW 2:15-3:30

294. Major Haiku Poets
4 units (Ueda) not given 1994-95

296. Readings in Modern Japanese Literature
4 units, Aut (Storey) MW 11-12:15

297. Images of Women in Modern Japanese Literature
4 units (Ueda) not given 1994-95

298. Translation Workshop
4 units, Win (Ueda) MW 2:15-3:30

330. Seminar in Heian Fiction
5 units (Hare) not given 1994-95

333. Seminar in Japanese Classical Drama
5 units (Hare) not given 1994-95

396. Seminar in Modern Japanese Literature
5 units (Ueda) not given 1994-95

KOREAN

1, 2, 3. First-Year Modern Korean
5 units, Aut, Win, Spr (Cho) MTWThF 1:15

21, 22, 23. Second-Year Modern Korean
5 units, Aut, Win, Spr (Cho) MTWThF 2:15

101, 102, 103. Third-Year Modern Korean
3 units, Aut, Win, Spr (Cho) by arrangement

200. Directed Reading in Korean
units by arrangement, Aut, Win, Spr (Cho)
by arrangement

271. The Structure of Korean — (Same as Linguistics 271.)
4 units, Win (Cho) by arrangement

ECONOMICS

121. The Economic Development in Greater China — (Same as Food Research 148/248.)
5 units, Spr (Park) TTh 1:15-3:05

124. The Japanese Economy
5 units, Win (Aoki)

126. Comparative Economic Institutions: The Economics of Transition
5 units, not given 1994-95

131. The Development of the Korean Economy
5 units (Kim)
134. Development of the Newly Industrialized Economies
5 units, not given 1994-95

220. Marxian Economic Theory
5 units, not given 1994-95

293. Reform and Transition in Socialist Economies
5 units, not given 1994-95

EDUCATION

161. Introduction to Teaching and Learning in Asia
3 units, Spr (Herring) by arrangement

274. Learning, Teaching, and Schooling in Japanese Society
4 units (Rohlen) not given 1994-95

306C. Cultural Approaches to Education and Development—(Same as Anthropology 239.)
3-5 units (McDermott) not given 1994-95

HISTORY

159. Introduction to Asian American History
4-5 units, Spr (Chang) MTWTh 10

192A. Chinese History from Earliest Times to the 9th Century —(Same as Asian Languages 156.)
5 units, Win (Neskar) MTWThF 11

192B. Chinese History from the Mongols to the 19th Century
5 units, Spr (Kahn) MTWThF 11

192C. Modern China, 19th and 20th Century
5 units (Van Slyke) not given 1994-95

194A. Early and Medieval Japan to 1500
5 units, Aut (Mass) MTWTh 9

194B. History of Japan, 15th-19th Century
5 units, Win (Ketelaar) MTWThF 10

194C. History of Japan, the 19th Century
5 units, Spr (Ketelaar) MTWThF 10

265S. Undergraduate Research Seminar: Asian-American History — (Same as History 465.)
5 units (Chang) not given 1994-95

290. Undergraduate Colloquium: United States and Japan
5 units (Duus) not given 1994-95

292. Undergraduate Colloquium: Postwar Japan
5 units (Duus) not given 1994-95

5 units (Ketelaar) not given 1994-95

295A. Undergraduate Colloquium: The Korean War—Watershed in Asia
5 units (Van Slyke) not given 1994-95

296. Undergraduate Colloquium: Ordinary Lives—The Social History of Early Modern China
5 units, Aut (Kahn) T 1:15-3:05

299. Undergraduate Colloquium: The Institutions of Medieval Japan
5 units, Win (Mass) W 1:15-3:05

390. Graduate Colloquium: United States and Japan
4-5 units (Duus) not given 1994-95

390A. Graduate Colloquium: Aspects of Late Imperial Chinese History
4-5 units, Aut (Kahn) W 1:15-3:05

390C. Graduate Colloquium: Topics in Late Traditional and Modern Chinese History
4-5 units (Van Slyke) not given 1994-95

392. Graduate Colloquium: Postwar Japan
4-5 units (Duus) not given 1994-95

395A. Graduate Colloquium: Early and Medieval Japan
4-5 units, Aut (Mass) W 1:15-3:05

395B. Graduate Colloquium: Late Medieval and Early Modern Japan
4-5 units, Win (Ketelaar) W 1:15-4:05

395C. Graduate Colloquium: Modern Japan
4-5 units (Duus) not given 1994-95

399. Graduate Colloquium: The Institutions of Medieval Japan
4-5 units, Win (Mass) W 1:15-3:05

490A. Graduate Seminar: Modern Chinese History
8-10 units, Win, Spr (Van Slyke) M 1:15-3:05

490B. Graduate Seminar: Research in Modern Chinese History
4-5 units, Spr (Van Slyke)

493A, B. Graduate Seminar: Late Traditional Chinese History
4-5 units (Kahn) not given 1994-95

498. Graduate Seminar: Japanese History Texts—(Same as Asian Languages 251.)
4-5 units, Win (Mass) by arrangement

498A. Graduate Seminar: Japanese History Sources
4-5 units (Mass) not given 1994-95

PHILOSOPHY

46. Introduction to Chinese Thought—(Same as Asian Languages 46, Religious Studies 55.)
4 units, Spr (Ivanhoe)

113/213. Zhuang Zi—(Same as Asian Languages 113, Religious Studies 113.)
4 units (Ivanhoe) not given 1994-95
114/214. Neo-Confucianism—(Same as Asian Languages 231, Religious Studies 119A.)
4 units (Ivanhoe) not given 1994-95

211. Philosophical Texts of the Ming Dynasty—(Same as Asian Languages 232, Religious Studies 211.)
5 units (Ivanhoe) not given 1994-95

212. Interpreting Confucian Texts—(Same as Asian Languages 230, Religious Studies 212.)
5 units, Spr (Ivanhoe) MW 2:15-4:05

POLITICAL SCIENCE

20. Introduction to Comparative Politics
5 units, Spr (Staff)

115. Politics in the People’s Republic of China
5 units, Win (Staff)

125. The Rise of Industrial Asia—(Same as Economics 130.)
5 units, Aut (Lau, Okimoto, Raphael, Rohlen)

138B. Seminar: Security and Diplomacy
5 units, Spr (Lewis)

139A. Japanese Foreign Policy
5 units (Okimoto) given 1995-96

223. Seminar: Japanese Politics
5 units, Win (Okimoto)

RELIGIOUS STUDIES

14. Introduction to Buddhism
4 units (Faure) not given 1994-95

18. Zen Buddhism
4 units, Bielefeldt

20. Chinese Religious Thought and Practice
4 units (Faure) not given 1994-95

55. Introduction to Chinese Thought—(Same as Philosophy 46, Asian Languages 46.)
4 units, Spr (Ivanhoe)

113. Zhuang Zi—(Same as Asian Languages 113, Philosophy 113/213.)
5 units (Ivanhoe) not given 1994-95

116. Japanese Buddhism
5 units, Bielefeldt

117. Syncretism and Sectarianism in Chinese Buddhism
5 units (Faure) not given 1994-95

118. Ritual in East Asian Buddhism
4 units (Faure) not given 1994-95

119A. Neo-Confucianism—(Same as Asian Languages 231, Philosophy 114.)
4 units (Ivanhoe) not given 1994-95

124. Religion in Japan
5 units (Bielefeldt) not given 1994-95

136. Buddhist Yoga
4 units (Bielefeldt) not given 1994-95

150. Systems of Buddhist Thought
5 units (Bielefeldt) not given 1994-95

210. Speech and Writing in the Buddhist Traditions
4 units (Faure) not given 1994-95

211. Philosophical Texts of the Ming Dynasty—(Same as Asian Languages 232, Philosophy 211.)
5 units (Ivanhoe) not given 1994-95

212. Interpreting Confucian Texts—(Same as Asian Languages 230, Philosophy 212.)
5 units, Spr (Ivanhoe)

217. China and the West: Religion and Cultural Encounters
5 units, Aut (Foss)

221. Ch'an/Zen and Local Religion
5 units (Faure) not given 1994-95

230A. Zen Buddhism Seminar
5 units (Bielefeldt) not given 1994-95

258. Japanese Buddhist Texts—(Same as Asian Languages 258.)
5 units, Spr (Bielefeldt)

311. Buddhist Studies Seminar
5 units, Win (Bielefeldt)

315. Ch'an Studies: Methodological Issues
4 units (Faure) not given 1994-95

319. East Asian Religions
(Bielefeldt, Faure, Ivanhoe, Yearley)
by arrangement

ECONOMICS

Chair: David A. Starrett
Vice Chair: Frank A. Wolak


Associate Professors: Lawrence H. Goulder, Avner Greif, Frank A. Wolak
The department's purposes are to acquaint students with the economic aspects of modern society, 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 school in the professional schools (e.g., 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, as well as the Food Research Institute.

The Department of Economics Ph.D. program is one of the best in the country. 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 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, international trade, labor, macroeconomic 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. Students who declared an economics major before May 30, 1992 may remain under the old requirements for the major and honors programs or may elect to fulfill the new requirements. The old requirements for the Perspectives and Policies and the Quantitative Economics programs are found in previous versions of Courses and Degrees or in the department’s Information Book for Economics Majors, available in Economics 136. For transition arrangements for continuing majors during 1994-95, or for declaring the major, see the Information Book for Economics Majors.

The new program consists 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.

COURSE WORK REQUIREMENTS

(60 units)

1. Economics 1 (5 units).
2. Economics 180 (5 units). Students may substitute Math. 43 or an equivalent calculus course for this requirement.
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, 162, 165, and 185, 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, ex-
cluding 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 +/-NC.

An average letter grade indicator (LGI) 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 Studies, 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 determined by the instructor, but ordinarily will not exceed 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 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.

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 an LGI 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 LGI 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 get thorough grounding in the methodology of theoretical and empirical economics, while at the same time providing a 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, 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 Studies 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 170. 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. An average letter grade indicator (LGI) of ‘B’ must be maintained for all master’s level work. In addition, an LGI 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 in 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 Studies, 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, general theory, international economics, labor economics, monetary theory, public finance, structure of industry, theory of choice.

(The student cannot offer both general theory and theory of choice fields to fulfill the requirement.)

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 an LGI of ‘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, these 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 one field from 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 Studies. 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 departmental 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
Note — Consult the quarterly Time Schedule for the exact times courses are given.


2. 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, Spr (Topper)

3. Economic Analysis II — (Graduate students register for 152.) Analysis of growth and instability 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 (Hickman)
Win (Hall, Staff)
Spr (Jones)

Statistics for Social Scientists — (Same as Statistics 190.) Introduction to statistical methods relevant to the social sciences. Emphasis on description and examples of the use of statistical techniques. Three components: probability (basic rules of probability, counting, conditional probability, Bayes’ rule, discrete and continuous probability distributions); statistical inference (point estimation, tests of hypotheses, confidence intervals, large-sample methods); and data analysis (linear regression techniques and diagnostics, time series analysis). Statistical computer packages are used for inference and data analysis parts of the course. Prerequisite: Math. 41 or equivalent. DR:4(6)
3-5 units, Aut (Wyner)

Introduction to Accounting — (Graduate students register for 190.) Introduction to the principles and concepts underlying financial reports: the income statement, statement of financial position, and the “funds” statement, and the uses of such reports. No prior accounting is assumed. Students who have taken or are now taking a college-level accounting course may not enroll.
5 units, Aut (Epstein)
Spr (Canellos)

Introduction to Cost Accounting — (Graduate students register for 191.) Introduction to the principles and concepts underlying financial reports: the income statement, statement of financial position, and the “funds” statement, and the uses of such reports. No prior accounting is assumed. Students who have taken or are now taking a college-level accounting course may not enroll. Prerequisite: 90 or Industrial Engineering 133.
5 units, Win (Canellos)

State, Market, and Development — Sophomores only. Peters Seminar on the development problems of Asia, Latin America, and Africa, the development thinking by economists, and the policy relationships between the public and private sector. Focuses on analytical techniques used by development economists.
5 units, Win (Meier)

Economic Theory in Historical Perspective — The historical development of economic theory from several perspectives. Emphasizes the progress of analytic clarification and elaboration. Also, the influence of contemporary economic and political categories with which different economists worked, and the relation of the development of economic theory to concurrent developments in political and social thought.
5 units, not given 1994-95

100B. Limits of Economic Rationality I: The Nature of the Social Bond — (Same as French and Italian 377E.) Confrontation of three ways to account for society in an individualistic framework: the Social Contract (Hobbes, Rousseau); the “Invisible Hand” of the market (Smith, Walras); society as a crowd (Tarde, Freud, Keynes). Comparison with the Durkheimian tradition.
3-5 units, Win (Dupuy)

Economic Policy Analysis — Policy issues. Papers and cases required. Limited enrollment. Topics vary with instructor. Writing Focus course. Prerequisites: 51, 52
5 units, Aut (Schleicher, Topper)
Win (Albers, Zimmerman)
Spr (Reynolds, Schaffner)

5 units, Aut, Spr (Lau)
Win (Kocher)

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 (Beltratti, Horvath)
Win (Schleicher)
Spr (Jones)

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. Prerequisite: 51 and 102.
5 units, Aut (Royalty)
Win (Rothwell)
Spr (Schaffner)

The World Food Economy — (Same as Food Research 103.) 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) MW 9-10:50

Commodity Futures Markets and Prices — (Same as Food Research 105.) The uses and functioning of commodity futures markets, market performance issues and measures; and analysis of the economic effects of futures markets. Prerequisite for Economics majors: 1.
5 units (Peck) given 1995-96
  5 units, Aut, Spr (Haak)

  4 units, Aut, Win (Staff) MWF 10

113. Technology and Economic Change—(Same as Science, Technology, and Society 107.) 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, late-comers 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). DR:9(5)
  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-WWI. Topics: attitudes toward technology and science, demography, institutional changes, politics and military technology, and production technology.
  5 units, Win (Greif)

116. American Economic History—The history of American economy from colonial times to present, emphasizing the years between the Revolution and WWII. The application of economic analysis to historical issues. Topics: American growth record and its determinants, economics of slavery and the Civil War, industrialization in a land-abundant country; historical causes of the Great Depression, role of the family in American economic history. Term paper required. Prerequisite: 1.
  5 units, Aut (David)

118. The Economics of Development—The economic problems and policy concerns of Third World countries. Topics: theories of economies’ structural transformation during the process of economic development, inequality and poverty, agriculture and rural development, rural markets, migration, population growth, education, nutrition, and government policies. Focuses on principles, not case studies. Prerequisite: 51.
  5 units, Win (Kochar)

119. Development and Population Interactions in the Third World—(Same as Food Research 121/219; graduate students register for Food Research 219.) 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, Win (Yotopolous) TTh 1:15-3:05

120. Socialist Economies in Transition—Privatization and restructuring in Eastern Europe and the former Soviet Union. Issues: property rights; governance of firms; methods of ownership transfer including mass and voucher privatization programs; reallocation of resources across sectors; unemployment; wage policies; and other conditions for growth and stability.
  5 units, Spr (Litwack)

121. The Economic Development in Greater China—(Same as Food Research 148/248; graduate students register for Food Research 248.) The processes of economic development through the experience of economic and social transformation in the People’s Republic of China, Taiwan, and Hong Kong. Emphasis is on socialist economic reforms in mainland China since 1978, including agricultural reforms, rural industrialization, reform of state-owned enterprises, international trade and foreign investment, fiscal and financial reforms, and regional inequality and poverty. Topics: pace and sequence of reform in socialist economies, record of socialist planning in China, lessons from development experience in Taiwan, political economy of unification of Hong Kong in 1997.
  5 units, Spr (Park) TTh 1:15-3:05

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. DR:9(S)

5 units, Spr (Harris)

123. Economic Development in Latin America —
(See as Food Research 218.) Open to advanced undergraduate students with consent of instructor. 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 economies to newly industrializing countries. The recent experience of macroeconomic stabilization, transformation of traditional agriculture, industrial restructuring, labor market adjustment, savings, and investment. The independence between economies at different levels of development (Mexico and the U.S., Central America and the Caribbean, and the Andean and Southern Cone countries).

5 units, Spr (Reynolds) MW 1:15-3:05

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.

5 units, Win (Aoki)

125. Economic Development Theory at Work: Can Africa Succeed?—(See as Food Research 149/249; graduate students register for Food Research 249.) Bridges gap between economic development theory and issues that arise in practice. The African experience is contrasted to illustrate the difficulties, challenge, and ambiguities of development theory. Topics: industrialization, structural adjustment, agricultural technology, institution building, famines, environmental issues, AIDS, and corruption. Students play a multimedia computer simulation.

5 units (Fafchamps) given 1995-96

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, economic 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, not given 1994-95

129. Planning and Analysis of Development Projects — (Same as Food Research 129/229; graduate students register for Food Research 229.) Techniques for designing, scheduling, costing, appraising, and monitoring development projects. Modules: identification and design; scheduling and costing using CPM methods; theory, calculation, and use of conventional appraisal criteria; development of monitoring and evaluation methods. Use of microcomputers with project scheduling and spreadsheet software required.

5 units, Spr (Zimmerman) TTh 10-11:50

130. The Rise of Industrial Asia — (Same as Political Science 125.) The political, economic, social, and cultural aspects of industrial development and change in Asia as a region. Consent of Director of Undergraduate Studies required for credit toward fulfillment of the requirements for an economics major.

5 units, Aut (Lau, Okimoto, Raphael, Rohlen)

131. The Development of the Korean Economy — History of the rise of S. Korea as a “Newly Industrialized Economy” from a poor and largely agrarian country in the aftermath of the Korean War. The macroeconomic, sectoral, and trade policies responsible for the success. Role played by public enterprises in the process. Prerequisite: 1.

5 units (Kim)

133. Population Perspectives in the Third World — (Same as Food Research 136, Human Biology 136, Sociology 153.) Topics: population growth in the Third World; demographic terminology and methods; trends and determinants of fertility, mortality, and migration; population growth in relation to the environment, urbanization, and development; theories of demographic change; population policies; prospects for the future.

5 units, Spr (Wilson) MW 9-10:50

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 1994-95

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 calculus, at least one course in regression analysis.

5 units, Win (Williams)

141. Public Finance and Fiscal Policy — Effects of government expenditure, borrowing, and taxation on resource allocation, national income and employment, prices, and income distribution. Prerequisites: 51, 52.

5 units, Spr (Nechyba)


5 units, Win (Pencavel)

147. Economics of Human Resources — Investment in human capital, including education, information, on-the-job training, and government training. Effects of human capital accumulation on wages and wage growth and on wage differentials by gender and race. Health insurance and health care reform. Prerequisite: 51.

5 units, Spr (Royalty)

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, Win (Staff)


5 units, Spr (Milgrom)

150. Economics and Public Policy — (Same as Public Policy 104.) The relationship between economic analysis and economic policies. Economic rationales for public policies, methods and techniques of policy evaluation and the role of benefit-cost analysis, economic models of political processes and their connection to the analysis of economic policymaking, and the relationship of income distribution issues to policy choice. How economic analysis is done, and why the political process regards it as useful but not as necessarily determinative of policy choices. Readings: the theoretical foundations of economic policy analysis and policy decisions, and the analysis of the adoption and implementation of programs in a variety of policy areas. Writing Focus course. Prerequisites: 51, 52 (52 may be taken concurrently).

5 units, Win (Noll)

151. Economic Analysis I — (See 51.)

152. Economic Analysis II — (See 52.)

153. Political Economy of Institutions — Develops a systematic approach to the study of political and economic institutions, applying the basic logic of the New Economics of Organization. Topics: modern political contexts (U.S. Congress, bureaucratic decision making, and international relations). Historical instances of the role of institutions in the stability of feudalism, the rise of the West, Glorious Revolution in England (1688), the French Revolution, and the American Civil War. Prerequisites: 51, 150.

3 units (Weingast) not given 1994-95

154. Economics of Legal Rules and Institutions — How legal rules, e.g., property rights, should be designed and enforced in externality situations. The Coase Theorem on social costs, private vs. public enforcement of law, the tradeoff between the certainty and severity of punishment, and ex ante vs. ex post sanctions (when the external harm is statistically uncertain). Applications to pollution control, automobile accidents, the criminal justice system, consumer products liability, land use regulation, and medical malpractice. Prerequisite: 51.

5 units, Spr (Sanchirico)

155. Environmental and Natural Resource Economics — (Same as Civil Engineering 175, 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. Examination of 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, e.g., wildlife populations and forests. Connections between population growth and the environment. Prerequisite: 51.

5 units, Spr (Gould)

156. Economics of Health and Medical Care — (Graduate students register for 256; same as Health Research and Policy 256, Medical Information Sciences 256.) Open to graduate students and undergraduates (juniors, seniors) with training in microeconomics and some background in statistics or mathematics. Empirical, institutional, and theo-
161. 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, and 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, Aut (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 (Greif)

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 1994-95

165. International Economics — Comparative advantage in production and trade among nations; trade policies; the international monetary mechanism; domestic monetary, fiscal, and exchange rate policies and their relationship to foreign trade. Prerequisites: 1, 51, 52.

5 units, Aut (Krugman)

Spr (Krueger)

167. Economic Policies of the European Community — (Same as Food Research 146/246; graduate students register for Food Research 246.) Analysis of current economic policies of the European Community and the internal market after 1992. Development of competition, transportation, and factor market policies; agricultural policy reform and changes in the food industry; external trade policy and relations with the U.S. and Japan; monetary and macroeconomic coordination and proposals for a common currency and central bank. Prerequisites: 51, 52, or equivalent.

5 units, Win (Avilés) TTh 10-11:50

170. Intermediate Econometrics I — (Same as 270.)

5 units, Aut (Kochar)

171. Intermediate Econometrics II — (Same as 271.)

5 units, Win (Wolak)

172. Intermediate Econometrics III — (Same as 272.)

5 units, Spr (MacCurdy)

180. Mathematics for Economists — Training in areas of mathematics frequently applied to economics. Preparation for 51Q; for students who have had some calculus but lack a strong mathematical background. Topics: functions of several variables; partial derivatives and differentials; first- and second-order conditions for optimization; elementary matrix algebra, determinants, and characteristic roots; quadratic forms; maximization of a function of several variables subject to equality constraints. Selected applications in economics. Prerequisites: 1, Math. 41 or equivalent.

5 units, Aut (Brown)

Win (Hammond)

181. Optimization and Economic Analysis — The development of optimization techniques, including calculus, linear and nonlinear programming, the calculus of variations, and control theory. Emphasis 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 1994-95

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: neo-classical, 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, Win (Arrow)

187. Junior Research Workshop — Preference given to juniors: also for students in honors program considering thesis topics in economics of technology and innovation, economic demography, and economic history. Introduces economics majors to current research in applied and theoretical economics. Students engage in team and individual research projects, write and critique reports. Topics: determinants of U.S. industrial "competitiveness," economics of science and technology policy; economics of networks and standardization, especially compatibility standards in computer and telecommunications industries. Enrollment limited to 15. Prerequisites: 51, one course in calculus.

5 units, not given 1994-95

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 (Haak)

PRIMARILY FOR GRADUATE STUDENTS

350. A.M. Thesis
by arrangement

400. Ph.D. Dissertation
by arrangement

A. CORE THEORY CURRICULUM


5 units, Aut (Pencavel)


5 units, Win (Bernheim)

204. Price and Allocation Theory III — Theory of resource allocation over time, competitive equilibrium and intertemporal efficiency, capital theory and factor pricing, growth theory and applications, equilibrium and dynamic efficiency with incomplete market structure. Prerequisite: 203.

5 units, Spr (Kurz)

208. Methods of Dynamic Optimization — Develops a basic facility in the use of dynamic optimization techniques employed in microeconomics and macroeconomics courses during the first year of the graduate program. Topics: discrete time dynamic programming under certainty, discrete time stochastic dynamic programming, and basics of optimal control in continuous time without uncertainty. Economic applications are developed in class and in problem sets.

5 units, Win (Starrett)


5 units, Win (Staff)


5 units, Spr (Hall)

212. Theory of Income and Economic Fluctuations III — Dynamic stochastic equilibrium models as tools for understanding the evolution of prices and quantities. Decision theories appropriate to dynamic and random environments and corresponding equilibrium concepts. Applications include models displaying growth and cyclical fluctuations.
models of monetary and fiscal policies. Econometric restrictions imposed by the models. Prerequisite: 211.
5 units, not given 1994-95

301A,B,C. Workshop in Microeconomics
10 units (Staff) by arrangement

310A,B,C. Workshop in Macroeconomics
10 units (Staff) by arrangement

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— The development of economic thought from the classical school to the first generation of the neoclassical. Survey of the theories of Adam Smith, David Ricardo and his contemporaries: John Stuart Mill, Karl Marx, W. Stanley Jevons, Carl Menger, and Leon Walras. The development of thought in terms of internal development and changing external economic conditions.
5 units, not given 1994-95

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, Spr (Harris)

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 1994-95

395 A,B,C. Workshop in Alternative Approaches to Economic Analysis
10 units (Staff) by arrangement

C. ECONOMIC DEVELOPMENT

To receive comprehensive credit in the field in 1994-95, students must complete both 215 and 217 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, comparative institutional analysis, and with the Food Research Institute.

215. Industrialization, Growth, and Economic Development—Theoretical and empirical analyses of growth, industrialization, coordination problems in industrial and rural development, industrial structure, surplus labor, rural-urban migration, self employment, multiple job holding, segmented labor markets, the changing nature of labor contracts, and poverty and inequality in developing countries.
5 units, Aut (Schaffner)

5 units, Spr (McKinnon)

267. Special Topics in International Economies—See section "I" below.
5 units, Spr (Krueger)

315A,B,C. Workshop in Economic Development
10 units (Staff) by arrangement

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—(Same as Science, Technology, and Society 207.) 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 1994-95

226. Problems in American Economic History—The American economy from colonial times to the present, focusing on the period 1790 to 1940. The
role of economic history as a distinctive intellectual approach to the study of economics. Topics: slavery and the Southern economy, labor scarcity and technological progress, the Great Depression of the 1930s, and the emergence of the U.S. to economic pre-eminence.

5 units, Aut (David)

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. The experiences of Britain, France, Germany, and other continental countries, with that order of emphasis. 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, not given 1994-95

228. Institutions in Economic History: Form, Function, and Evolution — (Same as 294.)

5 units, Win (Greif)

325A,B,C. Workshop in Economic History
10 units (Staff) by arrangement

MONETARY THEORY AND ADVANCED MACROECONOMICS

Requirements for the field are successful completion of 233 and 234.


5 units, Aut (Jones)


5 units, Win (Horvath)

F. PUBLIC FINANCE

To receive credit for the field, students must complete 241 and 242, and pass a comprehensive examination based on both courses.


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 distorting tax instruments, and dynamics of economic growth in the presence of non-reproducible natural resources.

5 units, Win (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) by arrangement

354A,B,C. Workshop in Law and Economics
6 units, Win, Spr (Polinsky)

G. ECONOMICS OF LABOR

To receive credit for the field, students must complete 246 and 247.


5 units, Aut (Pencavel)


5 units, Win (Royalty)

248. Labor Economics III — In-depth study of current research and policy issues in health care. Possible topics: demand for medical care and insurance, labor market for health care professionals, behavior of health care providers, technology diffusion and assessment, regulatory reform, evaluating quality of care, the political economy of health care reform. Empirical applications include models of limited dependent variables and the evaluation of experimental data.

5 units, not given 1994-95

345A,B,C. Workshop on Economics of Factor Markets
10 units (Staff) by arrangement
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.

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; anti-trust 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)


5 units (Arthur) given 1995-96

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 current state of research findings, and individual research projects in which students design and run an experiment.

3 units, not given 1994-95

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) by arrangement

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) by arrangement

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 (Bendor, Noll, Weingast)

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)

267. Special Topics in International Economics — Trade and development. Link between growth and trade policies of developing countries. Import substitution vs. outward-oriented trade strategies. Exchange controls and their consequences. Liberal-
ization of trade and payment regimes. Role of capital flows.

5 units, Spr (Krueger)

365A,B,C. Workshop in International Economics
10 units (Staff) by arrangement

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.

5 units, Aut (Kochar)

5 units, Win (Wolak)

5 units, Spr (MaCurdy)

273. Advanced Econometrics I — Large sample theory; maximum likelihood estimation; non-linear least squares; generalized least squares. Prerequisites: 272, Math. 113.
5 units, Win (Wolak)

274. Limited Dependent Variables — Discrete choice models; Tobit models; Markov chain and duration models. Prerequisite: 273 or consent of instructor.
5 units, Win (Amemiya)

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 1994-95

370A,B,C. Workshop in Econometrics
10 units (Staff) by arrangement

K. MATHEMATICAL ECONOMICS

To receive credit in the mathematical economics field, students must complete two courses from 284, 286, or 287.

5 units, Win (Hammond)

5 units, Win (Kurz)

5 units, not given 1994-95

284. Topics in Dynamic Economics — Principle of optimality, discounted dynamic programming under certainty and uncertainty, and applications in economics. Models of learning and expectation formation: Bayesian and non-Bayesian approaches. Develops extensive mathematical tools used in applications.
5 units, Spr (Kurz)

285. The Distribution of Income and Wealth — (See 185.)
5 units, Win (Arrow)

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, weakness of game theory. Learning and evolution in game theory. Cooperative games, the characteristic function and core, balanced games and relations to Walrasian equilibrium; Shapley value. Bargaining theory.
5 units, Aut (Hammond)

287. General Equilibrium Theory — Nonstandard methods in stochastic analysis and their application to price dynamics in large exchange economies. Focuses on Keisler's law of large number for Markov processes involving large sets of weakly interacting particles. Required original research paper using methods presented. Prerequisites: 202, 203, or consent of instructor.
5 units, Aut (Brown)
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, Aut (Judd)

290. **Multiperson Decision Theory** — (Same as Business 608.) Review of selected current 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) by arrangement

386. **Interdisciplinary Seminar on Conflict Resolution** — (Same as Law 325, Operations Research 366, 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, Tversky, Wilson)

**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 and political entities, etc.

5 units, Aut (Litwack)

292. **Comparative Analysis of Organizations and Systems** — Contractual and information economics approach to organization. Evolutionary games and complementarity analysis of the roles of history vs. expectations, mutations (experiments and economic integration) in the evolutionary dynamics of economic institutions. Multiple equilibria of development, transition, corporate governance and financial systems. What are efficient and other implications of the diversity of economic systems viewed as a cluster of institutions.

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, not given 1994-95

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. The discussion of the formation, function, and evolution of institutions highlights alternative conceptual frameworks — neo-classical, 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, Aut (Greif)

391 A,B,C. **Seminar in Comparative Institutional Analysis**

10 units (Staff) by arrangement

**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.

100X. **The History of German and European Economic Philosophy** — Berlin.

4-5 units, Aut (H. Krueger)


5 units, Aut (Balleix)
ENGLISH


Chair: Jay W. Fliegelman
Vice Chair: Albert J. Gelpi
Director of Creative Writing Program: Elizabeth Tallent
Director of Program in Writing and Critical Thinking: Kenneth W. Fields

Professors: John B. Bender (English and Comparative Literature), George H. Brown (on leave Autumn, Winter), Terry Castle, George G. Dekker, W. S. Di Piero (on leave Winter), J. Martin Evans, John Felstiner, Kenneth W. Fields, Jay W. Fliegelman, Regenia Gagnier, Albert J. Gelpi, Barbara Charlesworth Gelpi, David Halliburton, Shirley Heath (English and Linguistics), Seth Lerner (on leave Autumn), John L'Heureux, Herbert Lindenberger (Comparative Literature and English), Diane W. Middlebrook (on leave Winter, Spring), Stephen Orgel, Patricia A. Parker (English and Comparative Literature), Marjorie G. Perloff, Robert M. Polhemus (on leave Winter), Ronald A. Rebholz (on leave Autumn, Winter), David R. Riggs, Ramón Saldívar (English and Comparative Literature, on leave), Gilbert Sorrentino, Elizabeth Tallent, Elizabeth C. Traugott (Linguistics and English)

Associate Professors: Sandra Drake (on leave), Horace A. Porter
Assistant Professors: Sharon Holland, Suvir Kal, Joss Lutz Marsh (on leave), Lora Romero (on leave Spring), William Solomon, Michael Trainer, Robert Allen Warrior

Professor (Teaching): Larry Friedlander

Courtesv Professor: Charles R. Lyons (Drama)

Senior Lecturer: Helen B. Brooks


Visiting Professors: Tadeusz Slaweck (Winter), Sherley Williams (Winter)

Visiting Associate Professors: Opal Palmer Adisa (Winter), Regula Meyer Evitt (Winter), Hilary Schor (Autumn)

Visiting Assistant Professors: Ania Loomba, Elisa Narin van Court (Autumn), Bernice Zamora (Autumn)

Fellow: Tyrus Miller

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.

PREPARATION FOR THE MAJOR

Before declaring an English major, students should have satisfied the University writing requirement. Students should also have begun fulfilling the department's requirement of proficiency in a foreign language. (Information on this requirement should be obtained from the department's office.)
The following departmental requirements are in addition to the University's basic requirement for the bachelor's degree. Any two of the requisite 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

English majors are required to demonstrate proficiency in a foreign language. "Proficiency" means that the student is able to read at least at the level of facility expected in second-year college courses in a foreign language. As a minimum, the requirement may be fulfilled by passing a fourth-quarter foreign language course other than a "conversation" course or by demonstrating equivalent knowledge. English majors are urged to continue with literature courses in whatever language or languages they study. English majors who already possess the necessary language skills are urged to satisfy this requirement by taking an upper-division course in a foreign literature read in the original language. Such a course simultaneously fulfills one of their elective requirements.

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 such major writers as Chaucer, Shakespeare, Milton, Pope, Wordsworth, Dickens, Woolf, and Melville. Students must choose one course from each of the following eight areas. If possible, students should take courses in chronological sequence. 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 to satisfy this requirement in the sophomore or junior year. Seniors are admitted to English 180-189 seminars only with the consent of the instructor and are not given preference for course enrollment. Students are warned that delaying the seminar to their senior year may result in a delay of degree conferral.

C) Renaissance: English 113, 141, 151, 182D
E) Restoration and 18th Century: English 131, 174A, 184A, 184B*, 252
G) American Literature before 1900: English 121, 123, 127B, 162*, 186B, 186H*
P) Poetry and Poetics: English 92, 150, 150G, 188, 192

* Counts in one area only

In addition, students must elect three additional courses in English or American literature, or other literature written in English from those offered by the Department of English (excluding only English 1-2-3, 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.

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.

Students may apply as many as four English courses taken at other approved universities towards their major.

Major in English with a Creative Writing Emphasis — This program is designed for students who want a basic knowledge of 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. Like all English majors, they must choose one course from each of the eight areas B-H and P listed above, and fulfill the language and seminar requirements.

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.

Admission to English 190 is by consent of the instructor and is based on the quality of the student's work. Admission to a single quarter of 190 does not guarantee admission to a second quarter of 190. Students should submit a manuscript to the Creative Writing office at least one week before registration day of the term in which the course is offered. Students not admitted to the intermediate courses may take the introductory course a second time.

Major in 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. Either one course each in areas B, C, and D (emphasis in Medieval and Renaissance literature) or one course each in areas E, F, G, and H (emphasis in English and American literature from the Enlightenment to the present).
3. a) Students electing an emphasis in Medieval and Renaissance literature must take 111 and 112.
   b) Students electing an emphasis in English and American literature from the Enlightenment to the present must take 110.
4. Three elective English courses in the area of emphasis.
5. 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, and political science. 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 2. Each of these six courses must be approved in advance by the Interdisciplinary Program Director.
6. In addition, students in the interdisciplinary program must write at least one interdisciplinary
HONORS PROGRAM

Students who wish to undertake a more extensive program in English literature, including tutorials, a seminar, and independent research, are invited to apply for the honors program as soon as possible after declaring an English major and, in any case, no later than Autumn Quarter of the junior year. Application consists of completing a form and submitting a sample of critical writing. Admission is selective. Provisional admission is announced in early December. Permission to continue in the program is contingent upon successful completion of two tutorials and submission, by May 15, of a Senior Honors Essay proposal with bibliography.

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 Department of 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 Autumn and Winter Quarters of 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. In Winter Quarter, they take a 3-unit essay workshop, normally taught by the director of the honors program. The workshop focuses 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
Senior Honors Essay — 10 units

The director of the honors program may, in special cases, modify these requirements.

Note — For other opportunities for extended essay projects, see Senior Independent Essay and English 194 and 199.

ADDITIONAL 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). Only students who have successfully completed the initial course and who have applied for the follow-up course before the end of the quarter in which they took the initial course are eligible. 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 integrating the material in the courses in question.

SENIOR INDEPENDENT STUDY

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. Exceptional English majors who are not in the honors program but who elect Senior Independent Study may apply in the senior year for departmental honors if their program of study has been approximately equivalent to that required of regular honors students. Applicants should consult an adviser in the department.

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. Such students are not eligible to apply for admission to the Ph.D. program.

**GRADUATE PROGRAMS**

For University regulations governing advanced degrees see the "Advanced 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' letter grade indicator (LGI) of nine courses (normally 45 units) 101 and above, 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), which should result in a substantial piece of scholarly or critical writing. Permission to undertake these courses is at departmental discretion. Interested students should consult their faculty adviser or the Graduate Program Adviser (Building 40, Room 41G) 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 Romantic, Victorian and Modern, American. With the approval of the committee, the student, on the basis of evidence of substantial work done in one of these fields during their senior year, may substitute additional course work in other fields up to a maximum of 45 units. 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 requirements and major requirements for the A.B. in English. A minimum LGI 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 Distribution Requirements or department requirements) may be applied toward the A.M. However, additional undergraduate units not applied to the 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 Cre-
DOCTOR OF PHILOSOPHY

University regulations regarding this degree are discussed in the “Advanced 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, room 41G.)

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 bachelor’s 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 also 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 Graduate Director’s written consent. 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 four years. The first, second, and third years are devoted to graduate study and teaching; the fourth to preparation and writing of the dissertation. 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 in September 1992, or thereafter, take an apprentice teaching program in the first quarter of their second year. Apprentice teaching in the Autumn Quarter of the second year constitutes a 50-percent quarter of work as a Teaching Assistant. Apprentice teachers attend the classes, conferences, and tutorials of the master teachers, then take responsibility for conducting classes, holding conferences, and do an initial grading of papers. All these teaching activities are done under the supervision of the master teachers who insure the quality of instruction.

Those students who began their Ph.D. course prior to September 1992 enroll in the Teacher’s 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 introducing them to the major research techniques, scholarly methods, and professional contexts in the study of literature 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 the second year, students who began their Ph.D. course in September 1992, or thereafter, are required to complete a Teacher’s Workshop, which includes the Apprentice Teaching Program described above, in Autumn Quarter, and a Teacher’s 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 Autumn Quarter and the Teacher’s 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 sum-
Students who began their Ph.D. course in September 1992, or thereafter, are required to complete a Teacher’s Workshop, which includes the Apprentice Teaching Program described above in Autumn Quarter, and a Teacher’s Workshop in Winter Quarter.

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 and the Teacher’s 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 introducing them to the major research techniques, scholarly methods, and professional contexts in the study of literature 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 a Teacher's Workshop, which includes the Apprentice Teaching Program described above in Autumn Quarter, and a Teacher's Workshop in Winter Quarter.

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 and the Teacher's 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 accepted at the other institution is normally accepted here with the consent of the Director of Graduate Studies.

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. 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. 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.

4. Passage with a letter grade indicator (LGI) 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 10, Italian 10, and Spanish 15, respectively, with an LGI 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.

COURSES

NUMBERING SYSTEM

Writing and Critical Thinking Courses: 1-3
Introduction to Literature: 5
Cultures, Ideas, and Values: 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, 310-329
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.

Tutorial Center — A no-credit service to any student, undergraduate or graduate, who wants help with writing. Available through the Program in Writing and Critical Thinking office.

0 units, Aut, Win, Spr (Staff)

1.2. Writing and Critical Thinking — The successful completion in proper sequence of 1 and 2 satisfies the University’s Writing Requirement. 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. A variety of workshops are offered. The primary concern of all the workshops, whatever the nature of the readings, is student writing and its improvement. Readings are intended
to serve writing needs and are not studied for their own sakes. (DR:W)

1A,2A. Writing: Process, Structure, and Style—Focus is on student writing, supplemented by a general range of readings. A few sections are conducted as tutorials, focusing on individual weekly conferences for each student, in addition to the weekly class meeting.

3 units, Aut-Win, Win-Spr (Staff)

1B,2B. Social and Contemporary Issues—Writing is largely based on discussion of readings on politics and social matters.

3 units, Aut-Win, Win-Spr (Staff)

1C,2C. Literature and Related Topics—Writing is generally based on the study of various kinds of literature and other creative activities (film, etc.). These are not designed as conventional literature or film courses.

3 units, Aut-Win, Win-Spr (Staff)

3. Intensified Writing and Critical Thinking—Fulfills the University’s Writing Requirement 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. A variety of writing workshops is offered. The emphasis of all the workshops, whatever the nature of the readings, is student writing and its improvement. Readings are intended to serve writing needs and are not studied for their own sakes. (DR:W)

3A. Writing: Process, Structure, and Style—Focus is on student writing, supplemented by a general range of readings. A few sections are conducted as tutorials, focusing on individual weekly conferences for each student in addition to the weekly class meeting.

4 units, Aut, Win, Spr (Staff)

3B. Social and Contemporary Issues—Writing is largely based on discussion of readings on political and social matters.

4 units, Aut, Win, Spr (Staff)

3C. Literature and Related Topics—Writing is generally based on the study of various kinds of literature and other creative activities (film, etc.). These are not designed as conventional literature or film courses.

4 units, Aut, Win, Spr (Staff)

4. Directed Writing—For students who have completed the Writing Requirement and wish further work in writing. Taught partly by the tutorial method, tailored to the individual student’s needs.

3 units, Win (Emery)

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.

3 units, Spr (Evans)

7,8,9. Literature and the Arts—A Cultures, Ideas, and Values (CIV) sequence paired with special sections of Writing and Critical Thinking. The sequence emphasizes literature, writing, and the creative imagination. Lectures explore literature in its cultural context and include 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. Seminar instructors are experienced writing teachers, and student essays receive close attention. Writing seminars use a careful reading of the CIV 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 CIV requirement. Each student must enroll 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’s 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 CIV and Writing requirements.

7,7A. Antiquity and the Middle Ages—From Gilgamesh and the Hebrew Bible to the dawn of the Renaissance, covering works including Homer, classical sculpture, Plato, Vergil, Roman architecture, Confucius, the New Testament, Sung landscape painting, Marie de France, the Popol Vuh, Giotto, and Chaucer. Writing instruction concentrates on critical thinking, organization, and technical proficiency. DR:1 (three-quarter sequence)

5-8 units, Aut (Steidle, Staff) lectures plus sections and workshops

8,8A,8B,8C. Renaissance and Enlightenment—Readings from the Renaissance to the Enlightenment, including works by Machiavelli, More, painters of the Italian and the Northern Renaissance, Bach, Shakespeare, Donne, Milton, Defoe, Swift, Mozart, Rousseau, Mary Wollstonecraft, Paine, Jefferson, Madison. Writing instruction concentrates on style and diction, and on preparing and writing a research paper. DR:1 (three-quarter sequence)

5-8 units, Win (Riggs, Staff) lectures plus sections and workshops
9.9B, 9C. The Modern World — Thought and literature from the French Revolution to contemporary times, including works by Romantic, Victorian, Modernist, and Postcolonial writers in English; selections from Marx and Freud; art from European and African traditions; film and jazz. DR:1 (three-quarter sequence)

5-8 units, Spr (Tratner, Staff) lectures plus sections and workshops

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.) Introduction to the works of three of the greatest English writers: Chaucer, Shakespeare, and Milton. DR:7(2)

3 units, Spr (Evans)

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 the present. Treats fiction and poetry, with some drama. DR:7†(2)

3 units, Win (Paulson)

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, Faulkner. DR:7(2)

3 units, Aut (Solomon)

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. DR:7(2)

3 units, Spr (Paulson)

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 countries. DR:7(2)

3 units, Spr (L'Heureux)

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. DR:7(2)

3 units, Spr (Lindenberger)

50G. Poetry and Poetics — (English majors and others taking 5 units, register for 150G; same as Feminist Studies 164.) Introduction to poetic techniques and genres (narrative, lyric, elegy, satire), emphasizing texts in which representations of gender difference play a significant role. Ovid's *Metamorphoses*, Renaissance love lyrics, satiric verse from Alexander Pope to Queen Latifah, and contemporary American poetry that engages in dialogue with conventional notions of masculinity and femininity. DR:7†(2)

3 units, Aut (Middlebrook)

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. DR:7(2) or 8(3)

3 units, Spr (Andersson, Staff) MTWTh 9

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 and on the social uses of literature, and on the construction of gender roles. DR:7(2)

3 units, Spr (Lerer)

73. Shakespeare — (Same as Drama 59.) For the general student and the prospective English major. Reading of representative comedies, histories, and tragedies. DR:7(2)

3 units, Aut (Lyons)

90. Fiction Writing — Basic problems of narrative and imaginative writing. Prerequisite: completion of the writing requirement.

5 units, Aut, Win, Spr (Barbash, Caldwell, LaPlante, L'Heureux, MacDonald, Snowman, Williams)

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 (Donohue)

93. Playwriting — (Enroll in Drama 140.)

5 units, Spr (Smith)

BASIC UNDERGRADUATE SURVEYS, SEMINARS, AND WORKSHOPS

*Note* — Graduate students may receive graduate credit for three 100-level courses.

100. Seminar on Literature and the Institution of Literary Study — (Same as Comparative Literature 101.) Introduction to the comparative study of literature and to the history of poetic theory. The nature (and value) of literary interpretation; the
relation of literature to other arts and forms of knowledge; the means by which literary study is institutionalized within the university. Enrollment limited to 15.

100A. Seminar: Modernism, Fascism, and Technology — (Enroll in Comparative Literature 40.) (Area: H)
3-5 units, Aut (Pridmore-Brown)

102. History of the English Language — DR:9(4)
5 units, Spr (Wade)

105. Approaches to Point of View in Fiction — (Same as Linguistics 72.) Introduction to discourse analysis of short stories. Theoretical and practical materials leading to critical study of the relation between story, narrator, narrative point of view, and implied structures, e.g., speech acts, literal vs. implied meaning, reported speech and thought, tense, transitivity, backgrounding and foregrounding though complex sentence structure, social and cultural variation in use of language. DR:7(2) or 9(4)
4-5 units, Win (Traugott)

5 units, Spr (Evans)

111. Masterpieces of English Literature II: From the Enlightenment to the Modern Period — See 11.
5 units, Win (Paulson)

5 units, Aut (Solomon)

113. The Renaissance — A basic survey of English literature. (Area: C) DR:7(2)
5 units, Spr (Orgel) TTh 11-12:30

121. American Literature and Culture to 1855 — (Same as American Studies 150.) (Area: G)
5 units, Win (Fliegelman)

123. American Romanticism, Literature, and Painting — (Area: G)
5 units, Spr (A. Gelpi)

127B. Melville — (Area: G)
5 units, Win (Solomon)

130. The Novel — See 30.
5 units, Spr (Paulson)

131. The 18th-Century British Novel — (Area: E)
5 units, Aut (Castle) Spr (Bender)

132G. The 19th-Century English Novel — (Area: F) DR:7(2)
3 units, Aut (Polhemus)

135. The Romantic Novel — (Area: F)
5 units, Win (Bender)

5 units, Win (L’Heureux)

140. Introduction to Drama — (Same as Drama 50.) See 40.
5 units, Spr (L’Heureux)

141. Renaissance Drama — Survey of the great plays of English Renaissance; works from Kyd, Marlowe, Jonson, Webster. Selected works from French theater (Moliere, Racine) for comparative purposes. (Area: C)
5 units, Win (Friedlander)

150. Poetry and Poetics — (Same as Feminist Studies 164.) See 50. (Area: P)
5 units, Spr (Lindenberger)

150G. Poetry and Poetics — (Same as Feminist Studies 164.) See 50G. (Area: P)
5 units, Aut (Middlebrook)

151. Renaissance Lyric — (Area: C)
5 units, Aut (Ross)

154. Major Romantic Poets — (Same as 254.) Introduction to a selection of the poems and most important critical statements of Blake, Byron, Coleridge, Keats, Shelley, and Wordsworth. (Area: F)
5 units, Spr (B. Gelpi)

159. African-American Poets — (Area: H)
5 units, Win (Holland)

160A. Narrative Film and Aspects of Modernism
5 units, Win (Merritt)

5 units, Spr (B. Gelpi)

162. Language and Gender in American Fiction — (Area: G,H)
5 units, Win (Heath)

163B. Cultural Studies of the City — (Same as Urban Studies 166.) The way individuals and groups represent themselves to themselves and thereby construct their identities in urban environments, or how the modern city looks from different perspectives. Materials span the industrial city of 19th-century Britain to the post-industrial or postmodern city of late 20th-century U.S. Topics: economic
position, race, ethnicity, gender, work, leisure, space, property, security, danger, access to technology, and other components of urban identities. Genres: imaginative literature and social theory. (Area:F,H)

163D. Modern Chicano/a Fiction — (Enroll in Comparative Literature 196, Chicano Studies 198, Spanish 186.)

163F. The Representation of Reality in Fiction and History — (Enroll in Comparative Literature 60.)


5 units, Aut (Gagnier)

164B. Imagining the Holocaust — How has the literary imagination envisioned the destruction of European Jewry? The Holocaust and European, Israeli, and American responses, seen through documentation, diaries, fiction, poetry by Appelfeld, Borowsky, Wiesel, Celan, Levi, Roth, Malamud, Schindler’s List (Keneally) and through visual art. Survivor addresses the class. DR:7(2)

5 units, Aut (Felstiner)

164C. Ecology and Imagination — Going into nature with poems, to see how words and images may sharpen our sense of a threatened physical and animal world. Psalms, Book of Job, Shakespeare sonnets, and some 18th-century verse, readings from Thoreau, Muir, Black Elk, Coleridge, Wordsworth, Keats, Dickinson, Whitman, Hopkins, Yeats, Dylan Thomas, W. C. Williams, T. S. Eliot, Frost, Stevens, Lowell, Hughes, Stafford, Kinnell, Levertov, Snyder, Kenny, Harjo, Revard. (Area:H)

DR:7(2) or 8(3)

5 units, Win (Felstiner)

165A. Introduction to Medieval Culture — (Same as Medieval Studies 165.) See 65A. (Area:B)

DR:7(2) or 8(3)

5 units, Spr (Andersson, Staff) MTWTh 9

165B. Arthurian Literature — See 65B. (Area:B)

5 units, Spr (Lerer)

166. Introduction to Literary Theory — (Same as 266.) Introduces upper-division undergraduates to the “state of the question” in contemporary critical theory. The basic tenets of theory as laid down by Plato and Aristotle, Russian Formalism, the Frankfurt School (especially Walter Benjamin); the post-Structuralism of Barthes, Derrida, and Foucault; some feminist criticism, media criticism (Baudrillard), and cultural studies (James Clifford).

5 units, Win (Perloff)

168A. 20th-Century American Indian Writing — (Area:H)

5 units, Aut (Warrior)

169. Diasporic Identities — (Enroll in Comparative Literature 169.) (Area:H)

5 units, Spr (Palumbo-Liu)


5 units, Aut (Gelder)

171A. Chaucer’s Canterbury Tales — Chaucer’s poetry read in Middle English. (Area:B)

5 units, Aut (Narin, Van Court)

171C. The Gawain/Pearl Poet — Critical contexts for the works of the Pearl Poet: Sir Gawain and the Green Knight, Pearl, Patience, Cleanness, and Saint Erkenwald. (Area:B)

5 units, Win (Evitt)


5 units, Aut, (Friedlander) MW 11-12:30

173B. Shakespeare — (Tentative) As You Like It, Romeo and Juliet, Twelfth Night, Hamlet, Othello, The Winter’s Tale. (Area:D) DR:7t(2)

5 units, Win (Orgel)

173C. Shakespeare — Midsummer Night’s Dream, As You Like It, Romeo and Juliet, Twelfth Night, Hamlet, Othello, The Winter’s Tale. (Area:D) DR:7t(2)

5 units, Win (Orgel)

174A. Swift and Pope — (Area:E)

5 units, Win (Carnochan)

179B. Faulkner — (Area:H)

5 units, Spr (Moser)

180-189. Seminars for English Majors — Preference given to 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 litera-
ture, and so on. 189, which can count as one of three
required electives (see program for major in English
above), is mainly the theory of literary genres. Sign
up in department.

181. Seminar: The Other Middle Ages—
(Area:B)
5 units, Aut (Narin, Van Court)
182D. Seminar: Christopher Marlowe—
(Area:C)
5 units, Aut (Riggs)

184A. Seminar: Representations of Women in 18th-Century Literature—(Area:E)
5 units, Win (Castle)
184B. Seminar: The Gothic Novel—
(Area:E,F)
3 units, Spr (Bender)
185C. Seminar: Fictions and Visions of Childhood—(Area:F,H)
5 units, Aut (Polhemus)

186B. Seminar: American Realism and Naturalism—(Area:G)
5 units, Win (Solomon)
186H. Seminar: American Religions and American Literatures—(Area:G,H)
5 units, Aut (Warrior)

187A. Seminar: Joyce—(Area:H)
5 units, Spr (Tratner)
187C. Seminar: William Carlos Williams—
His Work and Influence—(Area:H)
5 units, Spr (Sorrentino)
187D. Seminar: Modern British and American Poetry—(Area:H)
5 units, Aut (Felstiner)
187E. Seminar: 20th-Century British Theater—(Area:H)
5 units, Win (Bartholomew)
187H. Seminar: Black Popular Culture—
(Area:H)
5 units, Aut (Holland)

187K. Seminar: The Literature of Fantasy—
(Area:H)
5 units, Spr (Friedlander)
187L. Seminar: The Colonial and Post-Colo-

nal Writings in India—(Area:H)
5 units, Spr (Loomba)

187P. Seminar: The Contemporary American Short Story—(Area:H)
5 units, Win (Tallent)
187R. Seminar: British Poetry Between the Wars—(Area:H)
5 units, Spr (Miller)

188. Seminar: Poetry, Poetics, and Sexual Poli-
tics—(Same as Feminist Studies 103G.) (Area:P)
5 units, Aut (Middlebrook)

189. Seminar: Caribbean Women Writers—
(Area:H)
5 units, Win (Adisa)

190. Intermediate Fiction Writing—May be taken twice. Manuscript must be submitted to Building 50, room 51C. Prerequisite: 90.
5 units, Aut, Win, Spr (Barbash, Caldwell, LaPlante)

190C. Science Fiction Writing—Intermediate workshop in writing science fiction. Manuscript must be submitted to Building 50, room 51C, by Friday, February 24.
5 units, Spr (LeGuin, Murphy)

191. Expository Writing—Advanced composition open to undergraduates and graduates. Taught through tutorials and partly through short lectures and general discussion. General instruction in writing.

191E. Advanced General Composition
3 units, Spr (Staff)

192. Intermediate Poetry Writing—May be taken twice. Prerequisite: 92.
5 units, Win (Donohue)

194. Individual Research—See section above on
"Undergraduate Programs, Opportunities for Ad-
vanced Work, Individual Research."
5 units, any quarter, by arrangement

195. Ad Hoc Undergraduate Seminars—Under-
graduates (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 quarter. No more than 5 units of credit
are given for 195 and/or 198 in one quarter. 195 may
not be used to fulfill departmental area or elective
requirements without permission.
any quarter, by arrangement

196A. Honors Seminar: Critical Approaches to
Literature—Required of all seniors in the English
honors program. A history of literary criticism from
Plato and Aristotle to Poulet and Fish.
5 units, Aut (Evans)

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.

any quarter, by arrangement


2 units, Aut (Holeton)

198M. Peters Seminar; Researching Indian America—Introduction to resources available at Stanford for writing about topics in American Indian studies. Small research projects take advantage of Stanford's archival and audio-visual collections

3 units, Aut (Warrior)


3 units, Aut (Bacon)

199. Senior Independent Study — Open, on approval by the department, to seniors majoring in English who wish to work throughout the year on a 10,000-word critical or scholarly essay (see "Note" under honors program in English). Applicants should 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 (UNDERGRADUATES AND GRADUATES)

Open to students in other departments who wish to broaden their programs.

205. Old English — Study of Old English; critical reading of short poems and selected prose in language and literature.

4-5 units, Win (Andersson)
266C. The Intellectual as Writer: Jean Paul Sartre — (Enroll in French and Italian 258E, Comparative Literature 258E.)
4-5 units, Spr (V. Mudimbe)

270. Beowulf—Prerequisite: 205 or equivalent. (Area:B)
4-5 units, Spr (Andersson) by arrangement

273. Colloquium: Shakespeare Through Performance — (Area:D)
4-5 units, Aut (Friedlander)

283. Paradigms of Modern Thought: Michel Foucault and The Archeology of Knowledge — (Enroll in Comparative Literature 280E, French and Italian 259E.)
3-5 units, Spr (V. Mudimbe)

287. T. S. Eliot and Virginia Woolf — (Area:H)
4-5 units, Win (Halliburton)

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)

290B. 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 March 24.
4-5 units, Spr (MacDonald)

292. Advanced Poetry Writing — Students selected by the instructor. Promising poetic writers write poetry in an atmosphere of mutual aid. Manuscripts must be submitted to the Creative Writing office by March 24.
4-5 units, Spr (Di Piero)

293. Verse Translation Workshop — 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)

296. Critical Theory and the Profession: An Introduction to Graduate Study for A.M. Students — The field of English literary studies has been reconfigured by theoretical and methodological developments. “Post-structuralism” (confrontational dialogues between theoretical and political positions as in Deconstruction, New Historicism, Cultural Materialism, Feminism, Queer Theory, Minority Discourse Theory, Colonial and Post-colonial Studies, and Cultural Studies) has altered disciplinary agendas and intellectual priorities. Texts, statements, and debates defining these issues are studied and students work towards a broad knowledge of the complex rewriting of the project of literary studies in process today.
5 units, Aut (Kaul)

296A. Critical Theory and the Profession: An Introduction to Graduate Study for A.M. Students — Introduces incoming graduate students to literary criticism and theory in the context of the past and present paradigms, conflicts, and modes of institutionalization. The role of texts in relation to social issues, canon formation, and the emergence of “new” approaches (e.g., cultural and ethnic studies), are compared and contrasted with more traditional approaches (e.g., philology, hermeneutics).
5 units, Aut (Halliburton)

302C. Renaissance Colonialisms — Explores contact between early modern Europe and its “others,” and how different models of colonial contact are offered by the journeys to the New World and voyages to the Orient. Ways in which these differences are expressed in and produced by travel narratives, plays, pageants, and other literatures of this period, relating these differences to issues within current postcolonial studies.
4-5 units, Spr (Loomba)

303D. The Culture of Seduction: Richardson, Mozart, Libertinism, and the Enlightenment — Focuses on four masterpieces of the 18th century that take the seduction of a woman (or women) as their central imaginative concern: Samuel Richardson’s Pamela (1739-40) and Clarissa (1749-51), Mozart’s The Marriage of Figaro (1786) and Don Giovanni (1787). Comic versions of the seduction plot in Pamela and The Marriage of Figaro. The subsequent “darkening” of the seduction theme in Clarissa and Don Giovanni. Reading/hearing of the basic works supplemented with readings from recent Richardson and Mozart criticism, and 18th-century intellectual and cultural history (Brigid Brophy’s Mozart the Dramatist). Literary and musical-dramatic issues are juxtaposed, and the evolution of the seduction genres and artistic forms is traced.
4-5 units, Aut (Castle)

303E. Colloquium: Institutions of Enlightenment — (Same as History 330/430A.) The cultural foundations upon which the Enlightenment instituted a public sphere and constituted its relationship to the private (or intimate) sphere, emphasizing France and Britain.
4-5 units, Win (Baker, Bender)

4-5 units, Aut (Dekker)

305F. Colloquium: The Novel and the Streets—Realism, Feminism, Materialism — Victorian social realism through novels and cultural clutter (street sweepers, street walkers, sewers, prisons, circuses, freak shows, maidservants, dandies, and discarded daughters). Novels by Dickens (Little Dorrit, Old Curiosity Shop), Gaskell (North and South), and Gissing (The Nether World); Mayhew's London Labour and the London Poor and Engels' The Condition of the Working Class in England; discussion of cultural studies and materialist feminism, including Benjamin, Adorno, Foucault, T. J. Clark, J. Walkowitz.

4-5 units, Aut (Schor)

306B. Colloquium: Afro-American Literature and Its Critics

4-5 units, Win (Porter)

306D. Chicano/a Poetry — (Enroll in Comparative Literature 350, Spanish 386.)

4-5 units, Spr (Espinosa)

306H. Chicana-Chicano Poetry and Poetics Since 1968

4-5 units, Aut (Zamora)

307C. Colloquium: Methods and Materials 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 to the present). Focuses on reconstructing the original ideological environments of selected modern works, including semantic, socio-economic, and technological dimensions. Attention to non-canonical and quasi-literary discourses used to historicize texts.

4-5 units, Spr (McPheron)

308D. Colloquium: The 20s and 30s

4-5 units, Aut (Solomon)

308G. Colloquium: American Renaissance — Survey of the “popular” and “classic” literature written in a variety of genres in the U.S. 1820 to 1870. Emphasis is on the diversity of literary production in the period and the relation of cultural production to social and historical issues: reform movements, westward migration, market capitalism, mass culture, slavery, ethnicity, evangelical religion, domesticity, sexuality, nationalism, gender, class. Readings in contemporary criticism, cultural theory, and literary history help understand and interrogate traditional conceptions of the "American Renaissance."

4-5 units, Win (Romero)


4-5 units, Spr (Lerer)

314. Seminar: Epic and Empire — (Same as Comparative Literature 314.) Focusing on Virgil's Aeneid and its influence, traces the European epic tradition (Ariosto, Tasso, Camoes, Spenser, and Milton) together with New World discovery and mercantile expansion in the early modern period.

5 units, Win (Parker)

332. Seminar: History as Literary Art

4-5 units, Spr (Fliegelman)

357. Modernist Poetics of the City

4-5 units, Win (A. Gelpi)

361. The Modern Tradition: Modernity and its Critics — Aspects of modernity via the work of its critics. Social and cultural theorists developed critical methods and analytical vocabularies to understand the material and ideological aparatuses of different social formations focusing on transitions and overlaps between the early modern/modern/post-modern. Key texts in social and cultural theory (some in literary theory) provide a working sense of these debates and issues.

5 units, Aut (Kaul)

362. Seminar: Narratology: Myth, Fiction, and History — (Enroll in Comparative Literature 349, French and Italian 349E, Spanish 394.)

5 units, Win (White)

369. Philosophies of Form — (Enroll in French and Italian 295E, Comparative Literature 369.)

5 units, Aut (Gumbrecht, Schnapp)

372. Seminar: Milton — Milton's minor (Nativity Ode, Comus, Lycidas) and major (Paradise Lost, Paradise Regained, Samson Agonistes) poems in the light of recent scholarship.

4-5 units, Spr (Evans)

373A,B. Shakespeare and Renaissance Drama: The Material Theater and the Material Text— For graduate students only. Two-quarter seminar. First term develops a set of approaches to English Renaissance theater, textual, historical, cultural, political, theoretical, including training in scholarly methods and investigatory practice. Students design an original project of investigation that may
become a dissertation subject. Second term is built around these projects, and eventuates in the writing of a scholarly paper of publishable quality. Quarters may be taken independently.

4-5 units, Win, Spr (Orgel)

384. Seminar: Poststructuralism and its Discontents — (Same as Comparative Literature 384, French and Italian 384E.) Focusing principally on Jacques Derrida, examines the continuing influence and critiques of poststructuralist writing, including the areas of orientalism, “race,” feminism, and gender studies.

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 (Tallent)

Win (L ’Heureux)
Spr (Sorrentino)

391. Advanced Work in Writing and Criticism

any quarter, by arrangement

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 (Fields)

Win (Williams)
Spr (DiPiero)

394. Independent Study — Preparation for qualifying examination and for the Ph.D. oral examination.

any quarter, by arrangement

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, by arrangement

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 in the current canon debates? Focus is theoretical. Little known modern and postmodern texts are read as exemplars of theoretical and methodological issues. Seminar; individual students report on the reading and lead class discussion. English faculty visit and present topics of their own expertise.

5 units, Aut (Perloff)

396L. Laboratory in Pedagogy — Required for first-year graduate students in English, Modern Thought and Literature, and Comparative Literature. Intensive focus on grading of papers and developing skills for leading discussions, working as a course assistant.

2 units, Aut (Fields, Reichard)

397A. Teachers Workshop I — Seminar and apprenticeship required for 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. Class 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.

5 units, Aut (Fields, Staff)

397B. Teachers Workshop II — Seminar for second-year graduate students teaching the first quarter of composition, focusing on the syllabus. Students share assignments, problems, and solutions they have encountered in their teaching.

5 units, Win (Fields, Staff)

397C. Teaching Workshop III — See 397B.

5 units, Spr (Fields, Staff)

397R. Theory and Issues in Writing and Literacy — (Enroll in Education 248.)

4 units, Win (Sperling)

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, by arrangement

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, by arrangement

399. Thesis

any quarter, by arrangement

REGULARLY OFFERED
BUT NOT DURING 1994-95

122. American Literature, 1855-1917

123. American Literature, 1917 to the Present

158A. Plath, Sexton, Rich

161F. The Harlem Renaissance

201. Old Saxon

239. American Short Fiction

290A. Reading and Writing the Novella

314E. Seminar: Historical Interpretation of Renaissance Drama — Theory and Practice

316A. Seminar: Studies in Romanticism
PROGRAM IN ETHICS IN SOCIETY

Director: Susan Okin
Faculty Committee: Susan Okin, Chair (Political Science); Ken Arrow (Economics, emeritus), Barton Bernstein (History), Michael Bratman (Philosophy), Rachel Cohon (Philosophy), John Dupré (Philosophy), John Ferejohn (Political Science), Thomas Grey (Law), Eliza-thabeth Hansot (Political Science), Timothy P. Jackson (Religious Studies), David Kennedy (History), Barbara Koenig (Center for Biomedical Ethics), Debra Satz (Philosophy), David K. Stevenson (Pediatrics), Mark Tunick (Political Science), Sylvia Yanagisako (Anthropology)

Visiting Professor: Frances Kamm (Philosophy and Ethics in Society, Spring)
Visiting Assistant Professor: Peter de Marneffe (Philosophy and Ethics in Society, Winter, Spring)

The Program in Ethics in Society fosters scholarship and teaching on fundamental issues of personal and public morality. The program is grounded in foundational work in moral and political philosophy, but it also extends its concerns across a broad range of traditional disciplinary domains and to the study of specific applications in areas such as business, international relations, law, medicine, poverty and public policy, and technological regulation.

Students interested in pursuing studies in these areas should consult with the director.

Guest lectures are an important part of the program. These include the annual Tanner Lectures in Human Values, the Wesson Lectures in Problems of Democracy, and the Ethics in Society Lecture Series (five or six lectures/seminars on a selected theme that varies each year).

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 letter grade indicator (LGI) 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.
   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.

A typical student takes Philosophy 20 and 30 in the sophomore year. On admission to the hon-
ors 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 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 applied ethics (Philosophy 278). 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, please refer to the relevant department listings elsewhere in this bulletin.


5 units, Aut (Cohon) MWF 11 plus section

30. **Introduction to Political Philosophy** — (Enroll in Philosophy 30, Public Policy 103A.) Introduction to some fundamental issues of political life. Why do laws have authority? Can it be fair for some people to be wealthier than others? How free should society be? Do we need a government at all? Questions explored through a careful reading of the classic texts in political philosophy, from the 4th century B.C. to the present. DR:8(3)

5 units, Win (Porter)

77. **The Ethics of Social Decisions** — (Same as Philosophy 77.) Do adults have a moral right to do what they like as long as no one is harmed? Philosophical discussions of the general right to liberty, focusing on the question of whether adults have a moral right to use drugs (cocaine and heroin) for pleasure.

4 units, Win (de Marneffe) MWF 1:15

78. **Medical Ethics** — (Enroll in Philosophy 78, Human Biology 173.) Introduction to ethical theory. Topics: models of the doctor-patient relation, confidentiality, informed consent, abortion, euthanasia, criteria for death, distribution of scarce medical resources, genetic manipulation.

4 units, Spr (Kamm) TTh 1:15-2:30

98. **Dialogues Tutorial: Promises and Moral Obligations** — (Same as Political Science 98.) Addresses abstract issues of moral philosophy by focusing on a familiar, concrete, and accessible topic, the moral obligation to keep promises.

2 units, Spr (Tunick)

100. **Computers, Ethics, and Social Responsibility** — (Enroll in Computer Science 201; Science, Technology, and Society 215.)

3-4 units, Spr (Roberts)

105. **Introduction to African and Afro-American Studies** — (Enroll in African and Afro-American Studies 105.) DR:3(*)

5 units, Win (Porter)

136. **Population Perspectives in the Third World** — (Enroll in Economics 133, Food Research 136, Human Biology 136, Sociology 153.)

5 units, Spr (Wilson)


1-4 units, Aut, Win, Spr (Lusignan, Packenham, 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, Philosophy 175C.) DR:8f(3)

5 units, Aut (Okin)

156. **Economics of Health and Medical Care** — (Enroll in Economics 156, Health Research and Policy 256, Medical Information Sciences 256.)

5 units, Spr (Phibbs)

162. **Ethics, “Abominations,” and “Liberations”** — (Enroll in Religious Studies 162.)

5 units, Spr (Jackson)

164. **Introduction to Race and Ethnicity in American Experience** — (Enroll in History 164, American Studies 164, Chicano Studies 164.) DR:3

5 units, Spr (Fredrickson, Gutierrez)

170. **Ethical Theories** — (Enroll in Philosophy 170.)

4 units, Win (Hurthoushe)

171. **Political Philosophy** — (Enroll in Philosophy 171.)

4 units, Spr (Satz)
177. Anti-Racism, Multi-Culturalism, and Common Humanity — (Enroll in Philosophy 177.)
4 units, Win (Satz)

185. The Distribution of Income and Wealth — (Enroll in Economics 185.)
5 units, Win (Arrow)

190. 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 made available a week prior to the presentation. Group discussion follows.
3 units, Win (de Marneffe) W 1:15-3:05

200A,B. Honors Thesis — Limited to Ethics in Society honors students.
8-10 units, any quarter (Staff) by arrangement

210. Ethics and the Built Environment — (Enroll in Science, Technology, and Society 210.)
3-4 units (McGinn) given 1995-96

266. Medical and Legal Ethics — (Enroll in Religious Studies 266.)
5 units, Spr (Jackson)

268. Seminar: Contemporary Theories of Justice — (Enroll in Political Science 268, Philosophy 175D/275D.)
5 units, Win (Okin)

286. Character and the Good Life — (Enroll in Religious Studies 286.)
5 units, Spr (Yearley)

288. Limits of Economic Rationality I: The Nature of the Social Bond — (Enroll in French 377E.)
4 units, Win (Dupuy)

PRIMARILY FOR GRADUATE STUDENTS

273. Topics in the Philosophy of Economics — (Enroll in Philosophy 273.)
4 units, Spr (Dupré, Satz)

278. Graduate Seminar in Applied Ethics — (Enroll in Philosophy 278.) Interdisciplinary. Faculty and students present issues of public and personal morality, topics chosen with the advice of instructor. Student-prepared reading list is available to class a week prior to presentation. Group discussion follows.
3 units, Spr (de Marneffe)

285. The Distribution of Income and Wealth — (Enroll in Economics 285; same as 185.)

370. Gender, Law, and Public Policy — (Enroll in Law 380.)
3 term units (Rhode) not given 1994-95

FEMINIST STUDIES

Chair: Estelle Freedman
Program Committee:
Faculty: Alice Bach, Paulla Ebron, Sharon Holland
Graduate Women's Network Coordinator: Brooke Ackerly
Staff: Diana Akiyama
Students: Kathleen Beman, Elizabeth McKinney
Women's Center Coordinator: Felicia Lee
Resource Faculty and Staff:
Anthropology: Jane Collier, Carol Delaney, Paulla Ebron, Joan Fujimura, Akhil Gupta, Purnima Mankekar, Sylvia Yanagisako
Art: Lisa Bloom, Wanda Corn, Suzanne Lewis, Melinda Takeuchi
Asian Languages: Susan Matisoff
Athletics: Tara Van-Derveer
Business: Joanne Martin, Debra Myerson
Chemistry: Carl Djerassi
Classics: Andrea Nightingale, Daniel Selden, Susan Stephens, Susan Treggiari
Comparative Literature: Patricia Parker
Dance: Janice Ross
Drama: William Eddelman, Harry J. Elam, Anna Deavere Smith
Education: Susan Christopher, Elizabeth Cohen, Nel Noddings, Francisco Ramirez, Myra Strober, Joan Talbert, David Tyack
Feminist Studies: Diana Akiyama, Kim Gillespie, Miranda Joseph, Susan Krieger
French and Italian: Brigitte Cazelles, Odile Hullot-Kentor, Carolyn Springer
German Studies: Russell Berman, Kathryn Strachota
History: Joel Beinin, Judith C. Brown, Lisa Ann Cody, Gabrielle Hecht, Katherine Jollick, Kennell Jackson, Nancy Kollmann, Carolyn Lougee, Karen Sawsisak, Laura Smoller
Institute for Research on Women and Gender: Iris Litt, Sherri Matteo
Law: Barbara Babcock, Mary Dunlap, Janet Halley, Margaret Radin, Deborah Rhode, David Rosenhan
Library: Kathryn Kerns, Katherine Martinez
Linguistics: Shirley Heath, Elizabeth Traugott
Medical School: Anne Arvin, Helen Blau, Marita Grudzen, Roy King, Cheryl Koopman, Herbert Liederman, Charlea Massion
Music: Maria Johnson
Philosophy: John Dupre, Debra Satz
Political Science: Elisabeth Hansot, Susan Okin
Psychology: Laura Carstensen, Susan Nolen-Hoeksema, Felicia Pratto
Religious Studies: Alice Bach, Rudy Busto, Hester Gelber
Science, Technology, and Society: Renee Courcy
Slavic Languages: Monika Greenleaf
Sociology: Susie Chow, Sanford Dornbusch, Jerald Herting, Janet Johnston, Cecilia Ridgeway, Szonja Szelenyi
Spanish and Portuguese: Wilifrido Corral, Adrienne Martin, Mary Pratt, Yvonne Yarboro-Bejarano

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, and feminism throughout the University and facilitates the undergraduate major 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 terminal degree programs, and an article division. The Michelle Rosaldo essay prize is awarded for the best work in the social sciences and the Francisco Lopes essay prize for the best work in the humanities. Submissions are due in the Feminist Studies office April 10 for essays and May 10 for theses. Essays and theses completed later in Spring Quarter may be submitted for consideration the following year.

UNDERGRADUATE PROGRAM
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 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.

The major should normally be declared by the beginning of a student's third year, and no later than the first quarter of the fourth year. Students interested in Feminist Studies should consult with the chair of the program before submitting a plan of study. The Feminist Studies office is in Serra House, 415-723-2412. Students should choose two faculty advisers, one of whom may be 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 chair for final approval.

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 letter grade indicator (LGI) of 'B+' or better in course work in Feminist Studies. Normally, students apply for honors certification in the junior year, or, at latest, in 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. For students graduating in June, the first draft is due by the end of January, the second by mid-March, and the final draft by mid-April. 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. This certification must be turned in no later than May 15.

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 an LGI 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 may receive up to 10 units of credit for preparation of the honors thesis, but these units do not count toward requirement '1.'

Honors Certification is recommended for students who have achieved an LGI of 'B+' or better in their required course work in Feminist Studies and who have submitted a thesis judged to be of superior academic quality by the subcommittee of the Feminist Studies Committee charged with making such decisions.

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 adviser. 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 a practicum.

CORE
The core consists of five courses. The first three are required and should be taken in sequence, if possible. 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. Also, one of these two should offer a multi-cultural perspective.

Required Courses — Feminist Studies 101, 102, and 103.

Courses that fulfill the humanities requirement in the Feminist Studies major can be found among courses listed in English, Religious Studies, the arts, and languages.

Courses that fulfill the social science requirement in the Feminist Studies major can be found among courses listed under Anthropology, Sociology, Psychology, Education, Political Science, History.

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 adviser.

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 the adviser:

Cross-Cultural Perspectives on Gender
Feminist Perspectives on Science, Health, and the Environment
Race, Class, and Sex
Women in Language and Symbol
Women and Work
Women and Society: The 19th Century
Women and Society: The 20th Century

PRACTICUM

For Feminist Studies majors, the practicum, taken for 2 to 6 units, should involve field research, community action, or other supervised research. This requirement may be fulfilled by designing a public service internship or by undertaking supervised work in a department. After the practicum, the student must submit to the chair of Feminist Studies a three- to five-page written statement on its nature and its relevance to the major.

COURSES

Courses designated "same as," and listed by another department, are central to the Feminist Studies Program. Courses listed in Interdepartmental Offerings that count towards the Feminist Studies major 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.

CORE

101. Introduction to Feminist Studies: Issues and Methods — (Same as Anthropology 12.) Understanding the creation and perpetuation of gender inequality. Topics: sexuality, reproduction, work, family, welfare, violence, language, and religion. Examples from non-western societies illuminate the cultural and historical construction of gender in western society. DR:9†(5)

5 units, Win (Delaney)

102E/202E. Contemporary Issues in Feminist Theory — (Graduate students register for 202E; same as English 163H.) Recent developments in feminist theory in law, philosophy, economics, anthropology, and cultural studies. Prerequisite: 101 or consent of instructor.

5 units, Aut (Gagnier) MW11-12:30

102F. Reading the Feminine in Ancient Near Eastern Texts — (Enroll in Religious Studies 134.) Examines the connections between religion and gender found in the foundational Western texts of the Sumerian, Babylonian, Canaanite, and Israelite traditions, focusing on the divine realm and the secular world. Emphasis on literary analysis of ancient religious myths and epic texts. Images of male and female deities in literary and visual images. Prerequisite: 101 or consent of instructor.

4 units, Spr (Bach)

103B/203B. Subjectivity in Feminist Research — Subjective approaches to research on, by, about, and for women. What happens to social scientific description when women's perspectives and feminist values become central? Enrollment limited. Prerequisites: 101, consent of instructor.

5 units, Spr (Krieger) T 1:15-3:05

103D. From Theory to Praxis — (Same as Anthropology 144A.) Seminar puts into practice feminist theories of subjectivity, location, power, and political action. Students work in coordinated research and action projects focused on a cluster of interrelated policy issues, including adequate and affordable childcare, the protection and support of domestic service workers, and gender issues in immigration policy. Enrollment limited to 20. Prerequisite: 102 or consent of instructor.

5 units, Win (Yanagisako) MW 1:15-3:05

104. Practicum

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 three to five page statement on the nature of the internship and its relevance to the major. Must be arranged in advance through the program office. Prerequisites: at least one course in Feminist Studies, written consent of faculty sponsor.

1-6 units, any quarter, by arrangement

195. Directed Reading

For 1994-95, the following courses may be taken for credit as Feminist Studies 103. The prerequisite for each is 101.

103E. Undergraduate Research Seminar: U.S. Women's History — (Same as History 254S.) For History and Feminist Studies majors. 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. Prerequisites: at least one U.S. history course, consent of instructor. Recommended: History 173B.

5 units, Spr (Freedman) Th 1:15-3:05
103F. Seminar: Gender and Political Theory — (Same as Political Science 266.) 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, Aut (Okin) T 3:15-5:30

103G. Seminar: Poetry Poetics and Sexual Politics (Same as English 188.) Undergraduate seminar in selected canonical works that influentially deploy gender typologies in the shaping of narrative. Readings from examples of epic (Ovid, Metamorphoses, Books I-IV), lyric (sonnet sequences) and dramatic (monologues and "conversation" poems) poetic modes; plus contemporary gender theorists (Luce Irigarary, An Ethics of Sexual Difference; Judith Butler, Bodies That Mean).
5 units, Aut, (Middlebrook) MW 1:15-3:05

103H. Naturalizing Power: Kinship/Gender/Race/Sexuality — (Same as Anthropology 244A.) 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. Undergraduate prerequisite: Feminist Studies 102 or Anthropology 90, or consent of instructor.
5 units, Spr (Yanagisako) MW 1:15-3:05

103J. Advanced Feminist Theory — (Same as Anthropology 245.) Interdisciplinary graduate seminar, open to advanced undergraduates by consent of instructor. Examines cultural difference and recent Feminist theory within dialogues of contemporary social theory. Enrollment limited to 20. Prerequisite: graduate students or advanced undergraduate majors in Anthropology or consent of instructor.
5 units, Spr (Ebron) T 1:15-4:05

INTERDEPARTMENTAL OFFERINGS

122. U.S. Women's History — (Same as History 173B.) 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. DR:9†(5)
5 units, Spr (Freedman) MW 1:15-3:05

130. Gender and Education — (Same as Sociology 132, Education 170.) 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. Evidence for bias against girls within schools, focusing on making arguments and forming policies based on research evidence.
4 units, Spr (E. Cohen) MW 3:15-5:05

131A. Women in Higher Education — (Same as Education 273X.) 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.
4 units, Aut (Christopher) TTh 2:15-4:05

134. Sociology of Gender — (Same as Sociology 142.) 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 socioeconomic processes. Arguments and evidence for each approach. Social consequences of gender inequality, e.g., the feminization of poverty and problems of interpersonal relations. DR:9(5)
3-5 units, Win (Ridgeway) TTh 12:30-2:05

138. Feminist Political Theory: Gender, Power, and Justice — (Same as Political Science 154.) Emphasis 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. DR:8†(3)
5 units, Aut (Okin) TTh 10

139A. Education and the Status of Women: Comparative Perspective — (Same as Education 197, Sociology 134.) 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. DR:9†(4 or 5)
4-5 units, Win (Ramirez) MWF 11-12:30

140A. Women in Transition to Democracy in Latin America — (Same as Latin American Studies 91.) Comparison of how women have participated in, and been affected by, transitions to democratic
politics in Argentina, Brazil, and Venezuela. Current political and feminist theory addresses the impact on women of changing political and economic models, family structures, religious and ethnic influences, and feminist movements. Emphasis is on the problems and possibilities of comparison.

5 units (Friedman) not given 1994-95

140B. Women in the Health Care Debate — The role of women and women's health care needs in the current health care debate, including consumption of health care by women; the health care needs of white, African-American, and Latina women; the way government agencies and media describe women's health; various women-centered health care proposals. Discussion with women's health advocates and in-class preparation of student research.

5 units, Aut (Gillespie) TTh 3:15-5:05

140C. Gender and Class — How differences of gender, race, ethnicity, and sexuality displace, constitute, and are constituted by class difference in the U.S. How ideologies of equality, individualism, meritocracy, and democracy work to erase class and other group oppressions. Topics: definitions of class; feminist revisions of Marxist analysis; family and gender roles in different class and race contexts; passing — transgressions of the categories of race, gender, and class; urban ethnic group relations; women and welfare. Interviewing and participant observation.

5 units, Aut (Joseph) MW 3:15-5:05

145A. Woman's Health Research — (Same as Human Biology 30.) Interdisciplinary view of research which involves biological and/or behavioral aspects affecting the health of women.

1 unit, Aut, Win, Spr (Litt) M 4:15

146. Women, Sexuality, and Health — (Same as Human Biology 169.) Health concerns of women. Topics: menstrual cycle disorders, contraception, infertility, pregnancy, menopause, nutrition, exercise, aging, stress, addictive disorders, sexuality, and women and the health care system. Issues considered from a social, psychological, and feminist perspective. DR:9†(4)

4 units, Spr (Matteo)

147A. Gender and Science — (Same as Anthropology 160, History and Philosophy of Science 160, Human Biology 170.) 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. DR:8†(3) or 9†(5)

5 units, Aut (Fujimura)

147B. Women and Technology — (Same as History and Philosophy of Science 123; Science, Technology, and Society 145.) Seminar on current and historical intersections between technologies and women's lives. Themes: the role of technologies, especially reproductive and visual, in constructing the roles of women; women as developers and users of technology; gendered descriptions of technology, technological professions, and the process of technology development; women at work and women's work in different historical periods. Discussion based on novels, reports and historical literature, commercials, and films.

5 units, Win (Courey)

150. Virgin Mary and Images of Power — (Same as Religious Studies 234.) 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 on the Middle Ages.

5 units, Aut (Gelber)

160A. Dance History and Philosophy — (Enroll in Dance 160A, Drama 127A.) Historical lecture/ survey of Western theatrical 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 as artistic developments and ideologies. DR:7†(2)

3-4 units, Win (Ross)

164. Poetry and Poetics — (Same as English 50G/150G.) Introduction to poetic techniques and genres (narrative, lyric, elegy, satire), emphasizing texts in which representations of gender difference play a significant role. Ovid's Metamorphoses, Renaissance love lyrics, satiric verse from Alexander Pope to Queen Latifah, and contemporary American poetry that engages in dialogue with conventional notions of masculinity and femininity. DR:7†(2)

3 or 5 units, Aut (Middlebrook) MTWTh 10

165A. Misogyny and Feminism in the Renaissance — (Enroll in Comparative Literature 20, French and Italian 55E.) Examines the debate on women's alleged biological, intellectual, and moral inferiority that was a central preoccupation of the European Renaissance. Influential arguments on the "querelle des femmes." How they are contextualized in a variety of literary genres, including courtly dialogues, conduct books, philosophical treatises, and chivalric poetry. Texts from the Italian Renaissance (Barbaro, Alberti, Castiglione, Ariosto, Machiavelli), with parallel developments in England and France.

4 units, Aut (Springer)

168. Cultural and Feminist Perspectives on Theology — (Same as Anthropology 147.) Introduces basic assumptions, approaches, paradigms, and cri-
tics which feminist thinkers brought to bear on traditional Christian theology. Readings on feminist theologians who made major contributions to feminist hermeneutics, Biblical studies, images of God, and theories of redemption and liberation which analyze the role of anger, violence, and exploitation in the exclusion of women from central positions in the Christian church community.

**DR:9t(5)**

5 units, Aut (Akiyama) TTh 1:15-3:05

**OTHER OFFERINGS**

These courses count toward the Feminist Studies major.

**ANTHROPOLOGY**

235. Mass Media and Subjectivities
5 units, Aut (Mankekar)

**ART**

229G. Colloquium: Women and Gender in Japanese Art
4 units, Aut (Takeuchi)

233D. Undergraduate Colloquium: Feminisms and Contemporary Art History
5 units, Win (Bloom)

**COMPARATIVE LITERATURE**

196. Modern Chicano/a Fiction — (Same as Chicano Studies 198, Spanish 186.)
4-5 units, Win (Espinosa) MW 11-12:30

**DRAMA**

54. Themes of Sexual Identity in Drama
4 units, Aut (Capri, McGurl) MW 10-11:50

127B. Dance and Live Art in the 20th Century
3-4 units, Spr (Ross) TTh 1:15-3:05

152. Performance and the Body
4 units, Win (Rayner) TTh 10-11:50

154. 20th-Century American Theater
4 units, Spr (Cole) MWF 1:15

154C. Technology and Narratives of Identity
4 units, Spr (Rayner) TTh 1:15-3:05

156. Contemporary Ethnic Drama
4 units, Spr (Elam) MWF 9

**ENGLISH**

131. The 18th-Century British Novel
5 units, Aut (Castle)

132G. The 19th-Century English Novel
5 units Aut (Polhemus)

154/254. Major Romantic Poets
5 units, Spr (B. Gelpi)

159. African-American Poets
5 units, Win (Holland)

161C. 20th-Century Afro-American Fiction
5 units, Spr (Porter)

162. Language and Gender in American Fiction
5 units, Win (Heath)

184A. Seminar: Representations of Women in 18th-Century Literature
5 units, Win (Castle)

187H. Black Popular Culture
5 units Aut (Holland)

187L. Seminar: The Colonial and Post-Colonial Writings in India
5 units, Spr (Loomba)

189. Caribbean Women Writers
5 units, Win (Adisa)

**FRENCH AND ITALIAN**

208E. Female Saints
3-5 units, Win (Cazelles)

273E. Women and Psychoanalysis
3-5 units, Win (Hullot-Kentor)

**GERMAN STUDIES**

293A. Gendered Perspective: Literature, Criticism, Theory
3-5 units, Win (Knodt)

**HISTORY**

212/312. Colloquium: Homosexuals, Heretics, Witches and Werewolves — Deviants in Medieval Society
4-5 units, Win (Smoller) T 2:15-4:05

225. Undergraduate Colloquium: East European Women and War in the 20th Century
5 units, Win (Jolluck)

**HUMAN BIOLOGY**

96H. Harrassment and Discrimination
3 units, Aut (Shuer)

**MEDICINE**

237. Women and Health
1-2 units, Aut (Grudzen, Massion) F 12-1

**MUSIC**

5E. African American Women Making Music: Voices and Images of Change
3 units, Aut (Johnson) MW 10:30-12

**POLITICAL SCIENCE**

153. Utopian Political Thought
5 units, Spr (Hansot)

**PSYCHOLOGY**

225. Psychology and Law
1-4 units, Aut (Rosenhan) TTh 1:45-3
plus section T 12:40-1:40
FILM STUDIES

Stanford does not offer an undergraduate major in Film Studies, but a number of courses are offered in various departments. A professional A.M. curriculum in Documentary Film and Video Production is offered by the Department of Communication.

COURSES

ANTHROPOLOGY

128. Ethnographic Film — (Same as Communication 115.)
5 units, Win (Gibbs)

235. Mass Media and Subjectivities — (Same as Communication 234.)
5 units, Aut (Mankekar)

ART

232F. Undergraduate Seminar: Interpretation and History, Hollywood Film 1939-1955
4 units, Spr (Nemerov)

COMMUNICATION

The following courses are open to all students:

101/201. Film Aesthetics
3-4 units (Breitrose) not given 1994-95

122A. Documentary Film
4 units, Aut (Krawitz)

141/241. History of Film
4 units, Win (Breitrose)

4 units, Spr (Breitrose)

The following course is primarily for Communication undergraduates. Non-majors are admitted only if space is available.

114. Introduction to the Moving Image
5 units, Aut, Spr (Staff)
The following workshops are available as part of the Summer Mass Media Institute: Film Production, Professional Journalism, Television Production, Screenwriting.

**ENGLISH**

160A. Narrative Film and Aspects of Modernism
5 units, Win (Merritt)

**FRENCH AND ITALIAN**

FRENCH DIVISION

191E. French Cinema
3 units, Win (Staff)

206E. The Grail Legend in Modern Culture
3-5 units, Spr (Cazesles)

ITALIAN DIVISION

191. Italian Cinema
3 units, Spr (Staff)

**GERMAN STUDIES**

134. Post-WWII German Film: Literaturverfilmungen
3-5 units, Spr (Kenkel)

**SPANISH AND PORTUGUESE**

294. Latin American Cinema: Ripstein
3-5 units (Ruffinelli) not given 1994-95

**FOOD RESEARCH INSTITUTE**

Emeriti: (Professors) Roger W. Gray, Bruce F. Johnston, Dudley Kirk
Director: Scott R. Pearson
Associate Director: Carl H. Gotsch
Associate Professor: Jeffrey C. Williams
Assistant Professors: Heidi J. Albers, Marcel Fafchamps, Scott D. Rozelle, Frederic Zimmerman
Visiting Professors: Francisco Avillez, Eduardo Lizano, Christopher C. Wilson
Acting Instructor: Albert Park

The Food Research Institute, a research and teaching unit in the School of Humanities and Sciences, was founded 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 institute does not supervise studies leading to a bachelor's degree, although certain of its courses may be counted toward majors in other undergraduate programs including Economics, Human Biology, Sociology, and Political Science.

The graduate teaching program is designed primarily for students with solid undergraduate training in economics or agricultural economics who possess a special interest in problems lying within the institute's areas of research. The general University requirements, as set forth in the "Advanced Degrees" section of this bulletin, should be consulted by all prospective graduate students.

**UNDERGRADUATE PROGRAMS**

**COTERMINAL A.B./A.M. PROGRAM**

The Food Research Institute offers the coterminal degree for advanced undergraduate students in Economics, Human Biology, Political Science, and other departments who are interested in a concentration of course work in the institute. For admission, a student must have a minimum letter-grade indicator (LGI) of 3.2. Prerequisites include Economics 51 and 52 and one course in quantitative methods. Students must apply at least four quarters in advance of the degree conferral date and before the end of their eleventh quarter. Application should be made to the chair of the institute's Instruction Committee. In addition to meeting the requirements for the undergraduate degree, students must complete the requirements for the A.M. as stated below. Students should also consult the University rules for coterminal degree programs.

**GRADUATE PROGRAMS**

**MASTER OF ARTS**

The A.M. degree with a concentration in International Developmental Policy is awarded to students who complete at least 25 units of work in the Food Research Institute and a total of 45 units of approved work with an LGI of 'B' or better. Advanced language training may not be included in the 45 units, and students are strongly encouraged to concentrate their course work in two or three areas within the institute. The master's program is designed to equip students with specific skills, and admission is not encouraged for those desiring a Ph.D.

Qualified graduate students from other schools and departments may apply for an A.M. degree within the institute. For such candidates, the same regulations prevail as for the regular A.M., ex-
cept that the four-quarter rule may be waived. Applications should be made to the chair of the Instruction Committee.

DOCTOR OF PHILOSOPHY

The first two years of the doctoral program consist of a series of required and elective courses totaling about 90 units. Course work in microeconomic theory, macroeconomic theory, and quantitative methods is required. In addition, students prepare for examination in elective fields through courses, seminars, and directed reading. Field examinations are taken by the end of the second year. Concentrations include Production, Consumption, and Market Analysis; International Agriculture Policy; and Agricultural Development and Economic Growth. A student wishing to offer a concentration outside this list or outside the institute must secure prior approval from the Instruction Committee.

Each student is required to prepare a detailed prospectus of the doctoral dissertation, which is subject to committee approval, and to defend research on the topic in a University administered oral examination. The complete dissertation is subject to faculty approval, but no further formal defense is required.

Students must also satisfy University requirements concerning residency and standards of progress as described in the “Advanced Degrees” section of this bulletin.

Ph.D. MINOR

Qualified doctoral candidates in other schools and departments may apply for a minor in Food Research. Requirements for this option include successful completion of two institute concentrations and approval by the chair of the Instruction Committee of the overall program of work.

FELLOWSHIPS

The Food Research Institute has available a limited number of University fellowships that provide tuition and stipend for qualified students. Instructions for applying for financial aid are included in the application packet. The financial aid application must be filed by January 1.

COURSES

PRIMARILY FOR UNDERGRADUATES

103. The World Food Economy—(Same as Economics 106.) 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) MW 9-10:50

105. Commodity Futures Markets and Prices—(Graduate students register for 205; same as Economics 107.) The uses and functioning of commodity futures markets, market performance issues and measures, and analysis of the economic effects of futures markets.

5 units (Peck) given 1995-96

121. Development and Population Interactions in the Third World—(Same as Economics 119.) 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, Win (Yotopoulos) TTh 1:15-3:05

129. Planning and Analysis of Development Projects—(Graduate students register for 229; same as Economics 129.) Techniques for designing, scheduling, costing, appraising, and monitoring development projects. Modules: identification and design; scheduling and costing using CPM methods; theory, calculation, and use of conventional appraisal criteria; development of monitoring and evaluation methods. Use of microcomputers with project scheduling and spreadsheet software required.

5 units, Spr (Zimmerman) TTh 10-11:50

136. Population Perspectives in the Third World—(Graduate students register for 236; same as Economics 133, Human Biology 136, Sociology 153.) Topics: population growth in the Third World; demographic terminology and methods; trends and determinants of fertility, mortality, and migration; population growth in relation to the environment, urbanization, and development; theories of demographic change; population policies; prospects for the future.

5 units, Spr (Wilson) MW 9-10:50

146. Economic Policies of the European Community—(Graduate students register for 246; same as Economics 167.) Analysis of the current economic policies of the European Community and the internal market after 1992. Development of competition, transportation, and factor market policies; agricultural policy reform and changes in the food industry; external trade policy and relations with the U.S. and Japan; monetary and macroeconomic coordination and proposals for a common currency and central bank. Prerequisites: Economics 51, 52, or equivalent.

5 units, Win (Avillez) TTh 10-11:50
148. The Economic Development in Greater China — (Graduate students register for 248; same as Economics 121.) The processes of economic development through the experience of economic and social transformation in the People’s Republic of China, Taiwan, and Hong Kong. Emphasis is on socialist economic reforms in mainland China since 1978, including agricultural reforms, rural industrialization, reform of state-owned enterprises, international trade and foreign investment, fiscal and financial reforms, and regional inequality and poverty. Topics: pace and sequence of reform in socialist economies, record of socialist planning in China, lessons from development experience in Taiwan, political economy of unification of Hong Kong in 1997.

5 units, Spr (Park) TTh 1:15-3:05

149. Economic Development Theory at Work: Can Africa Succeed? — (Graduate students register for 249; same as Economics 125.) Bridges gap between economic development theory and issues that arise in practice. The African experience is contrasted to illustrate the difficulties, challenges, and ambiguities of development theory. Topics: industrialization, structural adjustment, agricultural technology, institution building, famines, environmental issues, AIDS, and corruption. Students use a multimedia computer simulation.

5 units (Fafchamps) given 1995-96

163. Population and Development in Europe since 1750 — (Graduate students register for 263.) Topics: European populations before industrialization; the Industrial Revolution; the acceleration of population growth after 1750; mortality decline and public health; fertility decline; patterns and causes; the unique case of France; Ireland, famine and emigration; rapid urbanization; causes and consequences; mass emigration to the New World; new patterns of household and family composition; demographic aging; below replacement fertility; mortality and health in Europe today.

5 units, Win (Wilson) MW 10-11:50

PRIMARILY FOR A.M. STUDENTS

205. Commodity Futures Markets and Prices — See 105.

210. Application of Microcomputers to Economic Analysis — Food Research A.M. students have priority. Development of skills in using computer software suitable for the analysis of economic policies. Lectures with extensive, guided, hands-on lab sessions covering major application packages. Modules include spreadsheets, word processors, drawing and graphics programs, database management systems, communications and networking software. Enrollment limited to 20.

5 units, Aut (Gotsch) TTh 10-11:50

211. International Development Policy Analysis I — First in a three-quarter sequence. Elements of policy analysis with an emphasis on developing countries. Topics: the LDC policy environment; economic theory and policy analysis; analytical techniques for policy analysis focusing on PAMs, budgeting methods, and partial equilibrium methods. Computer-aided exercises. Prerequisite: demonstrated computer proficiency or concurrent enrollment in 210.

5 units, Aut (Gotsch, Pearson) MW 3:15-5:05

212. International Development Policy Analysis II — Continuation of analytical methods begun in 211 with an emphasis on optimization and general equilibrium modeling. Case studies examine exchange rate policies and food price and stabilization policies. Emphasis is on applications of analytical methods, writing, and class presentation. Prerequisite: 211.

5 units, Spr (Pearson, Albers, Josling) TTh 3:15-5:05

213. International Development Policy Analysis III — Continuation of case study approach in 212. Topics: analysis of international commodity markets, multilateral and regional trade negotiations, natural resource management, and environmental policy. Focus is on writing and presenting a research paper. Prerequisite: 212.

5 units, Spr (Pearson, Albers, Josling) MW 3:15-5:05

218. Economic Development in Latin America — (Same as Economics 123.) Open to advanced undergraduate students with consent of instructor. 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 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, Spr (Reynolds) MW 1:15-3:05


229. Planning and Analysis of Development Projects — See 129.


248. The Economic Development in Greater China — See 148.
249. Economic Development in Africa — See 149.
257. Contemporary Issues in International Economic Policy — For International Policy Studies and Food Research A.M. students: other graduate students welcome with consent of instructor. Economic analysis of current issues in the world trade system, including implementation of the GATT Uruguay Round; trade and competition; labor laws and trade; the conflict between trade and environmental concerns; developments in regional integration in Europe, the Americas, and the Pacific Rim; and the problems facing newly marketized and developing countries in the "new" trade environment. Seminar with student presentations.
5 units, Aut (Jostling) F 2:15-5:05
271. Special Topics in Latin American Economics — (Same as Latin American Studies 137/271.) Issues of economic development and integration, emphasizing the experiences of Central America. Shifts in economic thinking, case studies of specific adjustment processes and financial policies, and new approaches to regional integration in the Caribbean Basin in the wake of NAFTA.
5 units, Aut (Lizano) MW 9-10:50
323. Economic Development Theory — Survey of various theoretical approaches to economic development. Topics: growth and structural change; development strategies; the role of agriculture in the development process; peasant behavior and risk; contracts and information; theories of institutions and collective action; the role of markets; bureaucracy, interest groups, and the developmental state.
5 units, Aut (Fachamps, Rozelle) MW 11-12:50
324. Explorations in the New Development Economics — Expanded case for systematic interventions in economic development based on the absence of a complete set of markets in developing countries as a result of poverty and/or standard information economics reasons. Implications for strategies of economic development, especially exchange rates, trade and industrial policies, credit markets, and labor markets. Prerequisite: graduate trade or development course, or consent of instructor.
5 units, Win (Yotopoulos) MW 3:15-5:05
325. Individual Behavior, Market Institutions, and Economic Development — The relationship between markets and development. Topics: individual behavior in the absence of perfect markets; general equilibrium phenomena; risk management and consumption smoothing via income diversification, flexibility, asset accumulation, credit, and insurance; contract enforcement issues using sovereign debt as illustration; the role of institutions in supporting markets and policy implications; market behavior with imperfect enforcement and information covering currency use, segmented markets, discrimination, and networks. Introduces dynamic programming and numerical analysis, structural estimation, and the theory of repeated games. Computer exercises.
5 units, Spr (Fachamps) MW 11-12:50
5 units (Arthur) given 1995-96
327. Renewable Resource Economics and Developing Countries — Topics: theory of renewable resource economics, issues/difficulties in applying resource economics in developing countries, sustainable development, suboptimal outcomes, conflicting resource users/users, ecological and institutional constraints in economic models of resource allocation. Modification of existing theory and application to developing country resource issues include: tropical soils, timber management, preservation land/extractive reserves, large- and small-scale water projects. Prerequisite: graduate microeconomics. Recommended: familiarity with development and resource issues.
3-5 units, Win (Albers) TTh 10-11:50
330. Applied Static and Dynamic Programming Analysis — Application of linear, non-linear, mixed integer, and dynamic programming algorithms to a variety of optimization problems. Topics: the analysis of farming systems, agricultural sector models, optimal storage, economics of natural resource use, and issues in environmental policy. Emphasis is on numerical methods and actual implementation of the algorithms, including extensive use of GAMS. Strong policy orientation.
5 units, Aut (Williams) MW 9-10:50
331. Price Relationships and Analysis of Commodity Markets — Analysis of commodity prices and markets, including marketing margins, spatial and temporal aspects, storage behavior, information expressed in prices, market structure, market integration, demand systems, and sectoral models. Prerequisites: microeconomics, econometrics.
5 units, Win (Williams) MW 11-12:50
332. Economics of Production — Production theory emphasizing agriculture. Topics: production, cost, and profit functions; technological change; risk,
uncertainty, and environmental issues in models of production. Readings, complemented with problem sets, emphasize econometric estimation of production relationships. Prerequisites: 202, econometrics, or consent of instructor.

5 units (Rozelle) given 1995-96

363. Preparation for Writing Doctoral Dissertations—Required seminar for second-year students in the institute's doctoral program and open only to them. Preparation and presentation of dissertation prospectuses and of thesis literature reviews.

5 units, Spr (Pearson) TTh 10-11:50

365. Agricultural Policy Analysis I—First in a three-quarter sequence. Development of analytical tools commonly used in applied policy work: PAMs and budgeting techniques, partial equilibrium methods including discussion of applied welfare analysis, introduction to optimization methods at the household and sector levels. Extensive use of computer-based exercises.

5 units, Aut (Gotsch, Zimmerman) TTh 3:15-5:05

366. Agricultural Policy Analysis II—Continuation of the development of analytical tools begun in 365 with an emphasis on multi-market and CGE modeling. Series of case studies focus on trade and food policy, and structural adjustment. Attention to writing and presenting policy briefs. Prerequisite: 365.

5 units, Win (Josling, Pearson) MW 1:15-3:05

367. Agricultural Policy Analysis III—The international dimensions of agricultural policy, including the political economy of protection of agricultural commodities, multilateral and regional trade negotiations. Research seminar in which students present papers on topics related to agricultural policy in developed and developing countries.

5 units, Spr (Josling, Gotsch, Zimmerman) TTh 3:15-5:05

368A,B,C. Seminar on Doctoral Student Research—Presentations of dissertation research by doctoral student candidates.

1 unit, Aut, Win, Spr (Williams, Staff) T 12-1:50

371,372,373,374. Directed Reading and Research

371. Aut (Staff) by arrangement
372. Win (Staff) by arrangement
373. Spr (Staff) by arrangement
374. Sum (Staff) by arrangement

401,402,403,404. Dissertation Reading and Research

401. Aut (Staff) by arrangement
402. Win (Staff) by arrangement
403. Spr (Staff) by arrangement
404. Sum (Staff) by arrangement

FRENCH AND ITALIAN

Chair: Ralph M. Hester
Vice Chair: Robert Harrison

French Division

Professors: Jean-Marie Apostolidès (Paris, Autumn, Winter), Marc Bertrand, Brigitte Cazelles, Jean-Pierre Dupuy (Winter), René Girard (Autumn, Spring), Hans U. Gumbrecht, Ralph M. Hester, Valentin Y. Mudimbe (Spring), Michel Serres (Autumn, Spring)
Associate Professor: Elisabeth Mudimbe-Boyi (Spring)
Professor (Teaching): John G. Barson (Language Program Coordinator)
Senior Lecturers: Nelee Langmuir, Odile Hullot-Kentor
Lecturer: Mary Jane Parrine (Curator, Romance Languages and Humanities)
Visiting Professors: Timothy Hampton (Autumn), Wolf-Dieter Stempel (Winter)
Fellow: Alice Kaplan
Visiting Instructor: Anne-Sophie Godfroy-Génin

Italian Division

Professors: Patricia Parker (English, Comparative Literature, and by courtesy, Italian), Jeffrey Schnapp
Associate Professors: Robert Harrison, Carolyn Springer
Senior Lecturers: Maria Devine, Annamaria Napolitano (Language Program Coordinator)
Visiting Professors: Franca Nardelli, Armando Petrucci (Autumn)

* Recalled to active duty Winter, Spring

FRENCH DIVISION

The French Division offers a variety of programs in French language and linguistics, literature, cultural history, theoretical, and Francophone studies. Undergraduates may obtain the A.B. degree in French with emphasis on French Studies, French and European Studies, or French and Linguistics. In addition to awarding the Ph.D. degree, the French Division 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 division, a minor in French. (See Graduate Program, Specialization below.)

The French Division also offers a range of on-campus activities to enhance its academic programs. The division 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.

The division takes pride in its numerous publications: the Stanford French Review and the Stanford French and Italian Series have gained critical attention, while Constructions, edited by graduate students, represents a significant avenue of publication for young scholars.

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 professors contribute extensively to the French Division. Stanford and the French Division also enjoy contacts with the Institut d'Etudes Politiques, the Ecole Polytechnique, and other prestigious institutions.

**UNDERGRADUATE PROGRAMS**

The undergraduate French Division offers a variety of programs in French culture, language, literature, and linguistics, including a major in French, French as double major, and extended majors. 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, 124 or 125), 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 pre-revolution 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 Division, including courses from the Stanford in Paris programs, may be credited toward the major.

**MAJOR TRACKS**

**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:**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>123 (124 or 125) Advanced Language</td>
<td>4</td>
</tr>
<tr>
<td>130, (131, 132 or 133) French and Francophone Literature and Culture</td>
<td>12</td>
</tr>
</tbody>
</table>

**Any Four Courses on Prerevolutionary Periods:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>206E. The Grail Legend</td>
<td>3-5</td>
</tr>
<tr>
<td>208E. Female Saints</td>
<td>3-5</td>
</tr>
<tr>
<td>221. French Classical Theater</td>
<td>3-5</td>
</tr>
<tr>
<td>227. Elite and Popular Culture to 1789</td>
<td>3-5</td>
</tr>
<tr>
<td>294E. The Renaissance and Early Modern Tradition</td>
<td>3-5</td>
</tr>
</tbody>
</table>

**Sample Selection of Additional Courses:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>161. Voyage, Quest, and Transformation</td>
<td>3-5</td>
</tr>
<tr>
<td>178. Paris in History and Literature</td>
<td>3-5</td>
</tr>
<tr>
<td>191. French Cinema</td>
<td>3</td>
</tr>
<tr>
<td>237. French Democracy vs. British Liberalism</td>
<td>3-5</td>
</tr>
<tr>
<td>247E. Rousseau</td>
<td>3-5</td>
</tr>
<tr>
<td>258E. The Intellectual as Writer: Jean-Paul Sartre</td>
<td>3-5</td>
</tr>
<tr>
<td>262. Pronunciation and Phonetics</td>
<td>3-5</td>
</tr>
<tr>
<td>275E. History of the French and Italian Languages</td>
<td>3-5</td>
</tr>
<tr>
<td>296E. France in the Occupation</td>
<td>3-5</td>
</tr>
<tr>
<td>Paris Program courses or courses in other departments (approved by department adviser)</td>
<td>12-24</td>
</tr>
</tbody>
</table>

Subtotal: 91

Total: 157

**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 (with courses in Anthropology, History, Linguistics, Political Science, and so on). 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 departmental 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, Political Science, International Relations, and so on.

The following is one example of a concentration in this track.

**French and European Studies**

Students wishing to major in French with an emphasis on European Studies may combine department offerings with courses given by the Departments of History and Political Science, and the Program in International Relations. This path includes 12 units in six French language related courses numbered above 100 (any three of five courses French 120-129) and 12 units in three basic culture and literature courses (French 130, 131, 132). Three additional departmental 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, Political Science, International Relations, including two courses for 8 units taken at an approved program in France.

The following is one example of a concentration in this track.

**French Language and Basic Culture and Literature:**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>120. France Today</td>
<td>3</td>
</tr>
<tr>
<td>123. Creative Writing</td>
<td>4</td>
</tr>
<tr>
<td>124. Expository Writing</td>
<td>4</td>
</tr>
<tr>
<td>125. Contemporary French Usage, Spoken and Written</td>
<td>4</td>
</tr>
<tr>
<td>130. Middle Ages and Renaissance France</td>
<td>4</td>
</tr>
<tr>
<td>131. 17th- and 18th-Century France</td>
<td>4</td>
</tr>
<tr>
<td>132. 19th- and 20th-Century France</td>
<td>4</td>
</tr>
<tr>
<td>Subtotal</td>
<td>31</td>
</tr>
</tbody>
</table>

**Advanced Courses in French:**

- 227. Society and Culture | 4 |
- 278E. French Democracy vs. British Liberalism | 4 |
- 377E. Limits of Economic Rationality | 4 |
| Subtotal                | 12    |

**Other Courses:**

- Pol. Sci. 108/Business 379. Organizational Leadership | 5 |
- Pol. Sci. 116A, B, or C. European Politics and Society | 5 |
- Two related courses from Stanford Paris Program or other approved program in France, in History, International Relations, or French Culture/Literature | 8 |
| 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 departmental 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 and Basic Culture and Literature:**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
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<tr>
<td>130. Middle Ages and Renaissance France</td>
<td>4</td>
</tr>
<tr>
<td>131. 17th- and 18th-Century France</td>
<td>4</td>
</tr>
<tr>
<td>132. 19th- and 20th-Century France</td>
<td>4</td>
</tr>
<tr>
<td>Subtotal</td>
<td>30</td>
</tr>
</tbody>
</table>

**Advanced Courses in French:**

- 227. Society and Culture | 4 |
- 278E. French Democracy vs. British Liberalism | 4 |
- 377E. Limits of Economic Rationality | 4 |
| Subtotal                | 12    |

**Other Courses:**

- Pol. Sci. 108/Business 379. Organizational Leadership | 5 |
- Pol. Sci. 116A, B, or C. European Politics and Society | 5 |
- Two related courses from Stanford Paris Program or other approved program in France, in History, International Relations, or French Culture/Literature | 8 |
| 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 departmental 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 and Basic Culture and Literature:**

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<td>4</td>
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<tr>
<td>132. 19th- and 20th-Century France</td>
<td>4</td>
</tr>
<tr>
<td>Subtotal</td>
<td>30</td>
</tr>
</tbody>
</table>

**Advanced Courses in French:**

- 227. Society and Culture | 4 |
- 278E. French Democracy vs. British Liberalism | 4 |
- 377E. Limits of Economic Rationality | 4 |
| Subtotal                | 12    |

**Other Courses:**

- Pol. Sci. 108/Business 379. Organizational Leadership | 5 |
- Pol. Sci. 116A, B, or C. European Politics and Society | 5 |
- Two related courses from Stanford Paris Program or other approved program in France, in History, International Relations, or French Culture/Literature | 8 |
| Subtotal                | 18    |

**Total units** | 60 |
275E. History of the French and Italian Languages
  Subtotal .................................................. 12
  Total units in French ..................................... 39

Courses in Linguistics:
  1. Introduction to Linguistics .......................... 4
  110. Phonetics and Phonology or 120. Syntax
  or 130. Semantics, Pragmatics .......................... 4
  147. Ethnography of Communication .................. 4
  150. Introduction to Sociolinguistics ................ 4
  Subtotal .................................................. 16
  Total units ............................................... 55

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 (123, 124 or 125), three of the introductory series on French and Francoophone literature and culture (130, 131, 132, 133), and a minimum of ten additional courses (40 units). Of these courses, at least four (16 units) are selected from the 200-level courses offered by the French Division. The remaining six courses (24 units), which must have a significant French component, may be taken outside the division 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.

HONORS PROGRAM

Majors in their junior year may apply to the honors program if they have already taken five upper-division courses with a letter grade indicator (LGI) 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

All majors are strongly encouraged to study abroad. Stanford University offers two undergraduate programs for study in France. The Stanford Program in Paris offers undergraduate students the opportunity to study during the Autumn and Winter Quarters at the University of Paris. Students with at least two quarters of French may live with Parisian families or in residence halls and work under the supervision of a Stanford faculty member.

Many of the courses offered in Paris may count toward the requirements of the French major. All students either planning to attend the Overseas Programs in Paris, or returning from these programs, are encouraged to consult with the French undergraduate adviser 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, 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 “Advanced Degrees” section of this bulletin. They should have preparation equivalent to an undergraduate major in French with a minimum letter grade indicator (LGI) of 'B+' and should also have reached a high level of speaking proficiency, demonstrated either in a personal interview or by a tape recording sent to the department. Previous study of a language other than French is highly desirable. Recent Graduate Record Examination (GRE) results are required.
TEACHING CREDENTIAL

For information concerning the requirements for teaching credentials, consult the "School of Education" section of this bulletin and the Credential Administrator, School of Education.

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 LGI 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 is as follows:

Methodology of Teaching (260)

Eight courses (or 32 units) at the 200 level (whenever feasible, three of those courses must focus on the pre-revolutionary period)

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. Two questions 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 literary theory, philosophy, cultural studies, political theory, humanities, gender studies, film, francophone studies, 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 Division's exchange program with the Ecoles Normales Supérieures provides selected candidates with the opportunity to pursue dissertation research in Paris. Ph.D. candidates in French may also become involved in the production of Constructions, a scholarly journal published by graduate students in the Department of French and Italian.

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 three to five courses in the division.

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 receive credit for previous graduate work 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.

The following course requirements are effective 1994-95:

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 (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 Division 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. The candidate 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. Two questions must be answered in French and two 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.

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 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 “Advanced 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, etc.

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 division 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 Division with an LGI of ‘B’ or above. Interested students should consult the graduate adviser.

ITALIAN DIVISION

The Italian Division 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 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, Revo-
ution, 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

Located in a palazzo in downtown Florence, Stanford in Italy affords both undergraduate and graduate students the opportunity for intensive study of Italian language, culture, and literature. All Italian majors are encouraged to spend at least one quarter at Stanford in Italy. Many of the courses offered there may count toward the fulfillment of requirements for the Italian major. 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 Division requirements. Information on the Florence program is available in the “Overseas Studies” section of this bulletin, or at the Overseas Studies Office, room 126, Sweet Hall.

UNDERGRADUATE PROGRAMS

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. At least one advanced language course beyond the level of Italian 23.

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.

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 letter grade indicator (LGI) of ‘B+’ or better in all Italian courses are eligible for departmental 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 Spe-
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 LGI 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 graduate seminar paper representative of the quality of his or her graduate work.

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, the candidate 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, the members of the department vote for or against the 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 university 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 a palazzo along the Arno, is near important Florentine libraries and archives and the University of Florence. An additional resource is the Stanford Italian Review and the graduate student publication, Constructions, a scholarly journal published twice annually by the Department of French and Italian. Advanced students in the Ph.D. program may become involved in the Review in editorial and other capacities. 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.
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 members of 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 con-
siderable 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 a 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 division 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

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.

50E. A History of Western Theater and its Stages — (Same as French and Italian 50.)
   5 units (Gumbrecht) given 1995-96

55E. Misogyny and Feminism in the Renaissance — (Same as Comparative Literature 20.)
   4 units, Win (Springer)

206E. The Grail Legend in Modern Culture —
   Focusing on the legendary quest of the "Holy" Grail, explores the uses and transformations of medieval romance in modern culture. The first-known Grail romance (the Story of the Grail, Chrétien de Troyes, late 12th century). Traditional motifs: courtly love, life in the forest, and chivalric adventures in relation to the Grail as a symbol of an unattainable ideal. The re-inscriptions of those motifs in post-medieval culture, emphasizing films (e.g., Excalibur, Monty Python and the Holy Grail, Indiana Jones and the Last Crusade, Apocalypse Now). DR:7(2)
   3-5 units, Spr (Cazelles)

208E. Female Saints — Examines the medieval lives of saintly women, concentrating on: 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. DR:8f(3)
   3-5 units, Win (Cazelles)

214E. Imagine the Afterlife — Images of the afterlife in ancient and medieval mythology, literature, and religion. Readings: relevant passages from the epic of Gilgamesh, Plato's Phaedo and Republic, Homer's Odyssey, and Virgil's Aeneid, the Hebrew Bible and New Testament, Smith's and Haddad's The Islamic Understanding of Death and Resurrection, and Dante's Divine Comedy supplemented by critical works and slides from images of the afterlife in Western and Islamic art.
   4-5 units, Spr (Harrison)

233E. Dante's Divine Comedy — Open to all students. Intensive study of Dante's poem in relation to the culture and history of Medieval Europe. Topics: Dante and pre-Modern theories of autobiography; theology and poetics in the Comedy, Dante and the Natural Sciences, Dante's Christianization of Classical Epic (Virgil, Lucan, Statius), the Comedy and Dante's minor works.
   3-5 units, Spr (Frecce)

   3-5 units, Spr (Hullot-Kentor)

248E. Machiavelli — Open to all students. Introduction to Machiavelli's works, The Prince, Discourses, Dialogo della lingua, and the theatrical works, emphasizing Machiavelli's relation to classical and post-classical political theory, and to the political institutions of his period.
   3-5 units, Win (Frecce)

249E. Introduction to Hegel: Kojève and the End of History — Alexander Kojève's lectures on Hegel in Paris during the 1930s, emphasizing the interpretation of the "end of history." Readings: selections from Hegel's Phenomenology, Kojève's Introductory Lectures, and Fukuyama's The End of History.
   4-5 units, Spr (Harrison)

251E. F. T. Marinetti and Futurism(s) — (Same as Comparative Literature 251E.) Futurism (1909 to mid-1930s) developed into the first international
cultural-political avant-garde movement. Its aim was the revolutionary transformation of all spheres of everyday life and its influence encompassed Europe (especially France, Italy, and Soviet Russia), parts of Asia (Japan), N. America, and Latin America (Ultrai smo, Brazilian Modernism, etc.). Seminar examines Futurist artistic/literary theory and practice from its foundation by Marinetti through its various avatars. Readings of Marinetti through his late ’30s “technicist” poetry; writings by Palazzeschi, Papini, Soffici, Apollinaire, Cendrars, Kruchenykh, Khlebnikov, Mayakovsky, Crane, Williams, Pound, Lewis, Kambara Tai, Drummond de Andrade, Huidobro. Topics: machines and culture, the Futurist theater of surprise, poetry and performance, visual poetics and war, Futurism’s ties to Bolshevism and Fascism.

3 units, Spr (Schnapp)

256E. Social Reality and Individual Survival From Proust to Camus — Readings from novels of importance for innovative modes of narrative presentation and for the existential and societal situations they dealt with in an era of world wars and revolutions. Readings: Proust, Gide, Malraux, Céline, Sartre, Camus.

3-5 units, Spr (Bertrand)

258E. The Intellectual as Writer: Jean-Paul Sartre— (Same as Comparative Literature 258E.) The basic tenets and central themes of phenomenology. Close reading of J.-P. Sartre’s and M. Merleau-Ponty’s major philosophical works. Additional readings: Martin Heidegger, Edmund Husserl, Emmanuel Levinas, Gabriel Marcel and José Ortega y Gasset.

3-5 units, Spr (Mudimbe)

259E. Paradigms of Modern Thought: Michel Foucault and the Archaeology of Knowledge— (Same as Comparative Literature 259E.) Introduction to Michel Foucault’s theses and method and their significance for the individualization and the specification of each culture and each individual. Readings: main texts by Foucault and excerpts from Georges Canguilhem, Georges Dumezil, and Jean Hyppolite.

3-5 units, Spr (Mudimbe)

270E. European Fiction: Myth and Religion— (Same as Comparative Literature 30.) Nine masterpieces ranging from the Middle Ages to WWII. Discussions emphasize relationships of desire and conflict. Readings: Chrétien de Troyes, Yvain, Le Chevalier au Lion; Cervantes, Don Quijote; Voltaire, Candide; Flaubert, Madame Bovary; Dostoievski, Notes from the Underground; Proust, Combray; Franz Kafka, Metamorphosis; Thomas Mann, Mario and the Magician; Virginia Woolf, The Waves.

4 units, Aut (Girard)

273E. Women and Psychoanalysis— Freud’s psychoanalytic theory of women and object-relations theories which shaped the debates over female psychology since Freud. Contemporary novels or autobiographies by women approach the problem of women’s experience. Readings: Freud, Deutsch, Horney, Chasseguet-Smirgel, Chodorow, Benjamin Greenberg and Mitchell, Kristeva, Wolf.

3-5 units, Win (Hullot-Kentor)

274E. Political Theory and Mimetic Desire— The influence of mimetic theory on some political thinkers. Readings: Shakespeare’s Troilus and Cressida, parts of Hobbes’ Leviathan, and Carl Schmitt’s The Concept of the Political and Political Theology.

4 units, Spr (Girard)

275E. History of the French and Italian Languages— (Students may do written assignments in French, English or Italian). The genesis, emergence, and evolution of two languages, emphasizing the contrast between spoken and written language, regional and social dimensions, the relationship with Latin, the vernacular and the stages of emancipation of the living language, and processes of institutionalization of a national language whose identity and representativeness remain an ongoing object of study. Prerequisite: knowledge of French or Italian.

3-5 units, Win (Stempel)

276E. Introduction to Conversational Analysis— Dialogue is the natural setting for the study of stylistics and rhetoric in language use. Aspects of social interaction and the analysis of specific conversational practices (e.g., use of the “historical present”), direct discourse, hyperbole, irony, etc., used by speakers in exchanges. Analyses is based on a corpus of conversations recorded in France.

3-5 units, Win (Stempel)

279E. 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 on overall strategy for research, with an opportunity to explore bibliographical sources in the students’ particular fields of interest.

3 units, Aut (Parrine)

291E. Sports and Culture— (Same as Comparative Literature 291E.)

5 units, Win (Gumbrecht, Schnapp)

292E. Shakespeare and Mimetic Theory— The history of mimesis and its literary uses. Mimesis and imitation in aesthetics and human relationships, using principle works by René Girard. Readings: Elias Canetti—Crows and Power; René Girard—Things Hidden Since the Foundation of the World: Deceit, Desire, and the Novel; Violence and the
Sacred; The Scapegoat; Job, The Victim of his People; Shakespeare—A Theater of Envy.
4 units, Win (Girard)

294E. The Renaissance and Early Modern Traditions—(Same as Comparative Literature 294E.) French, Italian, and Spanish literary traditions and texts, including Rabelais, Montaigne, Louise Labé, Marguerite de Navarre, Garcilaso, Gongora, and the picaresque.
3-5 units, Aut (Hampton)

295E. Philosophies of Form—(Same as Comparative Literature 369.) Focus is on concepts of “form” as one of the key issues in the contemporary epistemological situation. Analyzing different philosophies of form from a historical perspective. Debates in humanities (the common denominator is a shift from content/interpretation to a paradigm of form/description), with different aspects of the entropy/negentropy-model in the sciences and the social sciences. Seminar is on concepts of form in presocratic and Platonic philosophy, in medieval theology, and in baroque poetics, emphasizing Kant’s Third Critique and Hegel’s Aesthetics, the phenomenological tradition (Bergson and Husserl) and its consequences for cultural history and the relation between philosophical positions (e.g., deconstruction) and scientific thought in our present intellectual situation.
5 units, Aut (Gumbrecht, Schnapp)

296E. France in the Occupation: A Site of Memory and Controversy—Essays, novels, and films since 1945 that come to terms with the experience of occupation and collaboration in France during WWII. Readings: Henry Rousso, The Vichy Syndrome; Alain Finkielkraut, Remembering in Vain: The Klaus Barbie Trial and Crimes against Humanity; selections of fictional representations (Patrick Modiano’s La Place de l’Etoile). Films: Marcel Ophuls, The Sorrow and the Pity and Hotel Terminus; Claude Chabrol, Une Affaire de femmes; and Claude Berri, Uranus. Topics range from the effect of the occupation on women to the execution of Robert Brasillach.
3-5 units Spr (Kaplan)

348E. Stendhal—Open to undergraduates. Stendhal (i.e., Henri Beyle, 1783-1842) has been canonized, with Balzac and Flaubert, as one of the great “realistic” novelists. Close reading of Stendhal’s novels Le Rouge et le Noir (1830) and La Chartreuse de Parme (1838) and analysis of the techniques of the realistic novel in general. Focuses on unexplored aspects of Stendhal’s intellectually and socially marginal position within European Restoration, years in Italy, and the form of his (often fragmentary) writing based on a multiplicity of non-literary or semi-literary discourses.
3-5 units, Win (Gumbrecht)

349E. Seminar: Narratology: Myth, Fiction, and History—(Same as Comparative Literature 349, Spanish 394.) Recent theories of narrative, the cognitive status of stories in myth, fiction, autobiography, and historical writing, the social function of storytelling, and the attack on narrative as the substance of ideology in certain modernist and postmodernist writings. Works by critics (Lukacs, Levi-Strauss, Bakhtin, Frye, Barthes, Ricoeur, De Man, Todorov, Gadamer) and their theories as applied to literary works by such writers as Balzac, Poe, Conrad, Mann, Woolf, Pynchon, et al.
5 units, Win (White)

377E. Limits of Economic Rationality I: The Nature of the Social Bond—Open to undergraduates with consent of instructor. Confrontation of three ways to account for society in an Individualistic framework: the Social Contract (Hobbes, Rousseau); The Invisible Hand of the Market (Smith, Walrus); society as a crowd (Tarde, Freud, Keynes). Comparison with the Durkheimian tradition.
3-5 units, Win (Dupuy)

384. Seminar: Poststructuralism and its Discontents—(Same as Comparative Literature 384, French and Italian 384E.) Focusing principally on Jacques Derrida, examines the continuing influence and critiques of poststructuralist writing, including the areas of orientalism, “race,” feminism, and gender studies.
5 units, Spr (Parker)

FRENCH DIVISION

Note—Changes in course offerings after Courses, Degrees, and Information 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 (100-129)
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, given Friday, September 23, if they have had any training in French before entering Stanford.

Auditing is not permitted in participation language courses.

1. First-Year French (First Quarter)—Systematic acquisition of communicative competence using an all-in-French, student-centered approach, emphasizing listening comprehension, oral, and
written expression in areas relating to daily life. Language lab and computer practice.

2. First-Year French (Second Quarter) — Continuation of 1. Expansion of linguistic skills to include past tense narration. Readings include short stories. Oral presentations. Written compositions on topics of interest. Language lab and computer practice.


4. First-Year Beginning Conversation — French 2 level. Prerequisite: 1 or equivalent.

5. First-Year Conversation — French life and culture: theater, movies, travel, etc. Useful information for students planning travel in France. Prerequisite: 2 or equivalent.

6. Second-Year Conversation — Intermediate level, designed to improve communication in everyday situations. Discussion topics on travel, food, shopping, student life, and current events using newspapers, magazines, and videos. Prerequisite: 3 or equivalent.

7. Conversation and Culture — France as seen through the writings of French and foreign authors. Oral presentations and discussions. May be repeated once for credit after an interval of two quarters. Prerequisite: 22 or equivalent.

8. Intermediate Conversation — Intermediate level, designed to improve communication in everyday situations. Discussion topics include travel, food, shopping, student life, and current events using newspapers, magazines, and videos. May be taken simultaneously with French 42. Prerequisite: one year of college French or equivalent preparation. No auditors.

9. Intensive French for Beginners — Accelerated first-year course in which either two or three quarters of French are covered. An all-in-French method is used, developing the four basic skills: listening, speaking, writing, and reading. Written exercises, compositions, conversational drills, and daily work in the language lab. No auditors.

10. Second-Year French (First Quarter) — Development of functional competency in reading, writing, and speaking with emphasis on student-generated activities. Review and amplification of essential grammar in its relationship to communicative activities.

11. Second-Year French (Second Quarter) — Continuation of 21. Readings include novels, plays, poetry, current events. Grammar study in the context of developing diversified writing styles. Student projects may include multimedia. Extra unit for individual or group projects.

12. Second-Year French (Third Quarter) — Continuation of 22. Reading and discussion of complete works, including francophone literature. Grammar study in its relationship to analytical writing. Extra unit for individual project (e.g., supplementary reading and written paper, utilization of video or multimedia, classroom presentations.)

13. Intensive Intermediate French — Accelerated second-year French in which students complete two quarters in eight weeks. Grammar review in conjunction with reading selected French texts. Discussions, in French, focus on reading material and on topics of current interest. Written exercises and composition, oral reports, videos, and work in the multimedia computer lab. Prerequisite: one...
year of college French or equivalent preparation. No auditors.
9 units, Sum (Staff) MTWThF

90. Reading French — Accelerated course specifically for the acquisition of reading ability. For graduate students or seniors seeking to meet University reading requirement for advanced degrees. No auditors.
4 units, Aut (Staff) MWF 10

ADVANCED LANGUAGE

101. Language Specials — With consent of department only. See instructor for section number.
1-5 units (Staff)

120. Conversation: France Today — Advanced conversation and discussion centered on contemporary problems and based on French newspapers, magazines, or films. May be repeated once for credit after an interval of two quarters. Prerequisite: 23 or equivalent.
3 units, Aut (Staff)

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, narration. Grammar and vocabulary review. Class discussion, all in French, focuses on model texts and original writing done by students. Prerequisite: 23 or equivalent.
4 units, Aut (Staff)

124. Expository Writing — Writing in French for interpretation, argument, and persuasion. Textual analysis and commentary. Some introduction to literary criticism in French; different styles of criticism focus on the exposed, spoken and written, as a genre and its relation to French notions of culture. Prerequisite: 23 or equivalent.
4 units, Win (Staff)

125. Contemporary French Usage, Spoken and Written — Grammar, syntax, and stylistics, emphasizing similarity and divergence of oral and written French. Some discussion of linguistics applied to the analysis of texts and oral presentations.
4 units, Spr (Cazelles)

129. Business French — For students who need to function and communicate in the French-speaking business world. Readings and acquisition of specialized vocabulary, discussions, written work, including translations and business letters. Prerequisite: 22 or equivalent.
3-4 units, Aut, Spr (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. DR:7(2)
3-5 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. DR:7(2)
3-5 units, Win (Hester)

132. 19th- and 20th-Century France — Masterpieces which have marked European culture since the 19th century are examined to understand their impact on cultural life and their lasting value. Prerequisite: 23 or equivalent. DR:7(2)
3-5 units, Spr (Bertrand)

133. Contemporary Francophone Literature: Africa, Caribbean—Authors Cesaire, Senghor, Mohamed Dib, Driss Chraibi, Simone Schwartz Bart, Maryse Condé, Sembene Ousmane, Camera Laye.
3-5 units (Apostolidès) not given 1994-1995

161. Voyage, Quest and Transformation — (Same as Comparative Literature 161.) Focus is on the motif of voyage and the character’s quest in order to achieve knowledge of the world, the self, and understanding or reconciliation with one’s self and/or with society.
3-5 units, Spr (Mudimbe-Boyi)

178. Paris in History and Literature—Recommended for students going to the Stanford Program in Paris. Introduction to the history of Paris from the Roman Cité to the capital of the kingdom and of the nation, to the present. The Medieval city of the 13th century with its crown of Gothic churches and edifices and clerical/academic culture (and counterculture) of the Latin Quarter; the 17th-century constructions of Places Royales and grand perspectives; the 1860s when Baron Haussmann built much of Paris, the Paris of Baudelaire and the Impressionists, and from the De Gaulle era. Readings: literary texts (extracts; poems) from Villon to Apollinaire; the Paris of the painters and photographers with slides. Prerequisite: 23 or equivalent.
3-5 units, Win (Bertrand)

191. French Cinema
3 units, Win (Staff)
198. Honors — Open to juniors and seniors with consent of adviser. 9-12 units total credit for completion of honors essay.
2 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) by arrangement

ADVANCED UNDERGRADUATE AND GRADUATE

Note — Prerequisites for the following courses taught in French are normally 130, 131, or 132, or equivalent.

221. French Classical Theater — The principles of French classical theater and how it was modeled on the works of classical authors. Tragedies and comedies by Corneille, Molière, and Racine, and critical writings of that period.
4 units, Spr (Girard)

227. Elite and Popular Cultures from Louis XIV to the 1789 Revolution — Important events of cultural history from the end of the religious wars, the Classical period of Louis XIV, to the 1789 Revolution. The achievements of learned/elite culture (Baroque, classicism, courtésianism, enlightenment) popular culture (celebration; writings and iconography). Slides.
3-5 units, Aut (Bertrand)

3-5 units, Win (Dupuy)

3-5 units, Win (Hullot-Kentor)

260. Methodology of Teaching — (Same as Education 293.) Approaches, methods, and procedures in relation to foreign language acquisition theory. Teaching practice regularly observed in demonstration class.
3-5 units, Spr (Hester)

261. Stylistics — Designed to achieve a high level of proficiency in written French. In-depth textual analysis of excerpts from various literary genres (novels, poems, essays), creative writing centered on specific subject matters, introduction to literary criticism.
3-5 units, Aut (Hullot-Kentor)

262. Pronunciation and Phonetics — Theory study and corrective work: articulation, intonation, rhythm, phonetic alphabet, etc.
3-5 units, Spr (Hester)

295A. La Fontaine: Five Fables
2 units, Aut (Serres)

295B. French Language Philosophy: The Classical Era
2 units, Spr (Serres)

299. Individual Work — For students engaged in special work.
1-12 units, any quarter (Staff) by arrangement

GRADUATE

372. Topic in French and Francophone Literature: The Discourse of (Self) Representation — (Same as Comparative Literature 372.) Critical analysis of major issues relating literatures in French and outside France, with a focus on Negritude and Surrealism, the question of the Other and the problematic of identity.
3-5 units, Spr (Mudimbe-Boyi)

399. Individual Work — For students in French working on special projects or engaged in pre-dissertation research.
1-12 units, any quarter (Staff) by arrangement

ITALIAN DIVISION

Note — Changes in course offerings are sometimes necessary after Courses, Degrees, and Information 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 — 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.
5 units, Aut, Win, Spr (Staff) MTWThF plus language lab

2. First-Year Italian (Second Quarter) — Continuation of 1 with emphasis on the development of
reading and writing skills, and on Italian culture. 
Prerequisite: 1 or equivalent. 
5 units, Aut, Win, Spr (Staff) MTWThF
plus language lab

3. First-Year Italian (Third Quarter) — Continuation of 1 and 2 with additional cultural and literary readings. Prerequisite: 2 or equivalent.
5 units, Aut, Win, Spr (Staff) MTWThF
plus language lab

7A,B,C. Individualized First-Year Italian — Same as 1, 2, 3. For students who, having conflicts with normally scheduled courses, wish to complete 5 to 15 units at their own pace in regular consultation with the instructor. Students must submit an application to the Italian language instructor and coordinator during first week of classes.
1-15 units, Win (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: 3 or equivalent.
3-4 units, Aut, Win (Staff)

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 (Staff)

23. Second-Year Italian (Third Quarter) — Continuation of 22. Prerequisite: 22 or equivalent.
3-4 units, Spr (Staff)

30. Conversation: Italy Today — Advanced conversation for students returning from the Florence program and/or who have completed one quarter of second-year Italian. Subject matter varies each term; may be repeated for credit. Prerequisite: consent of instructor.
2 units, Aut, Win, Spr (Staff)

41A,B,C. Accelerated First-Year Italian — Covers two or three quarters of Italian. Conversational drills and daily work in the language lab. All-Italian method used, developing the four basic skills: listening, speaking, writing, and reading. No auditors.
9-12 units, Sum (Staff) MTWThF

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 (Staff)

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 frequent writing assignments. Prerequisite: 22 or consent of instructor.
3-4 units, Win (Staff)

INTERMEDIATE-LEVEL LITERATURE

40. Modernism, Fascism, and Technology — (Enroll in Comparative Literature 40.)
3-5 units, Aut (Pridmore-Brown)

127. Italian Studies I — Introduction to Italian history through the study of specific events, movements, figures, and artifacts. Prerequisite: 3 or equivalent.
3 units, Aut (Napolitano)

128. Italian Studies II: The Middle Ages and the Renaissance — Selected literary works from the Sicilian school, the Stilnovisti, Dante, Petrarch, Boccaccio, and Machiavelli.
4 units, Win (Harrison)

129. Italian Studies III: Mannerism to the Modern — Selected works of Ariosto, Tasso, Galileo, Goldoni, Verga, and Pirandello.
4 units, Spr (Springer)

180. The New Italian Prose (La Nueva Prosa Italiana) — Benni, Buzzati, Morante, Sciascia: readings of their novels as representative of the latest generation of Italian novelists.
4 units, Aut (Napolitano)

191. Italian Cinema
3 units, Spr (Staff)

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) by arrangement

ADVANCED LITERATURE

216. Scattered Rimes — Open to graduate students and advanced undergraduates. The lyric of medieval Italian poets Dante, Cavalcanti, and Petrarch, emphasizing on how Petrarch inherited the Italian lyric tradition and transformed and modernized the genre to create a model of imitation known as Petrarchism. Readings: Dante's Vita Nuova Rime, Cavalcanti's Rime, and Petrarch's Canzoniere. Secondary readings in Italian and English. In English
4-5 units, Aut (Harrison)

256. Negotiating Difference: North and South in Contemporary Italy — The phenomenon of regional
difference in Italy from the 19th century to the present day. 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 representation of the Mezzogiorno, the rhetoric of regionalism from the Sicilian separatist movement to the Lega Nord. Focus is on narrative fiction and film (Verga, Levi, Sciaccia, Lampedusa, Visconti, Pasolini, Rosi).

4 units, Aut (Petrucci)

294. Materiality of Literature — The evolution of the book in its manuscript and printed forms in Italian vernacular culture in the Middle Ages and the Renaissance, with emphasis on the skills necessary to read, describe, and critically edit texts.

4 units, Aut (Nardelli, Petrucci)

297. Reading Course on the History of the Italian Language — Its lexical, morphological, and syntactical evolution from the 11th century to the present, emphasizing the philological analysis of literary texts. Students register under faculty sponsorship. Prerequisite: 22 or consent of instructor. Recommended: some background in Latin.

3 units (Staff) not given 1994-95

299. Individual Work — For students engaged in special work. See instructor for section number.

1-12 units, any quarter (Staff) by arrangement

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)

340. Ruins and Representation in Italian Romanticism — Byron's image of Rome as a "marble wilderness" recalls a literary and figurative tradition portraying the classical landscape as a locus of decay. For the emerging romantic sensibility of the 19th century, Italy was the privileged setting of a "poetry of ruins," essentially elegiac, dedicated to the nostalgic evocation of an irretrievable past. Alternative representations of ruins and archaeology as political rehabilitation, from the Italian Risorgimento and papal neoclassicism (Monti, Angelo Mai) to the nationalist rhetoric of Foscolo, Mazzini, Giberti, and the early Leopardi. Intersections between literature and the visual arts through the analysis of the representation of antiquity in museums, fresco cycles, and political festivals.

4 units, Win (Springer)

396. Problems in Archival Research: Aspects of Italian Written Culture — Examination of selected books and historical documents from the Medieval and Renaissance periods from a paleographical and codicological perspective. The structures and functions of Italian libraries and archives, emphasizing the practical skills necessary to conduct literary and historical research in Italy.

4 units, Aut (Petrucci)

399. Individual Work — For graduate students engaged in work on a special project in the field of Italian studies or pre-dissertation research. May be repeated for credit. See instructor for section number.

1-12 units, Aut, Win, Spr, Sum (Staff) by arrangement

GERMAN STUDIES

Emeriti: (Professors) Helmut R. Boeninger, Katharina Mommsen; (Adjunct Professor) Gertrude Mahrolz
Chair: Russell Berman
Assistant Professor: Karen J. Kenkel
Courtesv Associate Professor: Eckart Förster (Philosophy and German Studies)
Senior Lecturers: William E. Petig, Kathryn Strachota, Brigitte Ternaure
Lecturer: Henry Lowood
Consulting Professor: J. Alan Pfeffer
Visiting Professors: Eric Rentschler (Winter), Stefan Schleicher (Autumn, Winter), Hinrich Seeba (Autumn), Wolfgang Welsch (Autumn, Winter)
Fellow: Eva M. Knodt

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 undergraduate and graduate 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. 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 Distinguished Visiting Professorship in Comparative Western European Studies is funded by the Federal Republic of Germany. There is also a Distinguished Visiting Professorship in Swiss Studies funded by sources in Switzerland. These three professorships rotate 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 department also houses the Institute for Basic German (J. Alan Pfeffer, Founding Director). The institute holds a unique corpus of data on the contemporary German language, which is available for research to graduate students and faculty.

**UNDERGRADUATE PROGRAMS**

**BACHELOR OF ARTS**

Majors in German Studies formulate their plans in quarterly consultation with an undergraduate major adviser. All undergraduate major advising is coordinated by Professor Lohnes.

After completion of basic courses (German 22 or equivalent), majors normally select at least two German courses per quarter. 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). Including these classes, the total requirement for the A.B. is a minimum of 55 units of work beyond the basic courses. 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.

**HONORS**

Majors with a minimum letter grade indicator (LGI) 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.

**EXTENDED MAJOR IN ENGLISH AND GERMAN LITERATURES**

Students may enter this program with the consent of the chairs of both departments. See the “Department of 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.

**OVERSEAS STUDIES**

Detailed information on the center in Berlin is given in the pamphlet Overseas Studies, including a description of its courses in language, literature, culture, and other fields of Central European studies. Most credits earned in Berlin can be applied to the undergraduate major in German Studies. Students with the equivalent of two years of German are eligible to take courses at the Free University in Berlin.

**TEACHING CREDENTIALS**

For information concerning the requirements for teaching credentials, consult the “School of Education” section of this bulletin or inquire at the Degrees Program office, School of Education.

**CERTIFICATION OF PROFICIENCY IN GERMAN**

In accordance with standards developed by the American Council on the Teaching of Foreign Languages and the Educational Testing Service, the department certifies a student’s proficiency on three levels: intermediate, advanced, and su-
perior. This certification is not tied to the number of courses taken, but is a measurement of a student’s proficiency in listening comprehension, speaking, reading, writing, and culture. Detailed information is available in the department office.

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:

1. 201, 202 (Language and Style)
2. 251 (Syntax of Modern German)
3. A minimum of four courses, with 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.

Students concentrating in German culture studies should choose related courses in the Central European field in such departments as Anthropology, Economics, History, and Political Science.

A.M. candidates must take an oral examination toward the end of their last quarter.

MASTER OF ARTS IN TEACHING

The A.M. degree in the teaching of German is offered jointly by the School of Education and German Studies. The program includes 25 units of German in courses selected in consultation with the department adviser. For a statement of requirements other than German see the “School of Education” section of this bulletin.

STANFORD TÜBINGEN
GRADUATE EXCHANGE

Annually, one or two Stanford graduate students in German Studies are accepted as exchange students by the University of Tübingen, and their counterparts from Tübingen participate in academic programs at Stanford.

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 a qualifying paper as an example of their coursework. 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. The department does not legislate a canonic list. Instead, the student should, upon consultation with faculty members, compose a list that displays broad coverage of the material. The length of the examination list varies, but 50 items of various sorts (novels, poems, philosophical excerpts, etc.) might serve as a target figure. Together, the qualifying paper and the qualifying exam constitute the department qualifying procedure. 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. Students with heavy minor requirements (or in joint-degree programs such as
the Graduate Program in Humanities) may postpone the qualifying examination from the end of the sixth to the beginning of the seventh quarter, thereby gaining additional summer reading time.

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 30-minute question period and reserving an optional 10 minutes for questions from the chair of the examination.

Within three months of successful completion of the University oral, the student must submit a dissertation proposal to the department, approved by all members of the reading committee. The topic of the dissertation normally is directly related to the area of concentration in the University oral.

Students, regardless of their future fields of concentration, are expected to acquire near-native proficiency in German and thorough knowledge of the grammatical structure of German. Students are urged to take 311, Syntax of Modern German. The department expects Ph.D. candidates to demonstrate teaching proficiency in German; 302, Methods of Teaching 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 skill 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.

During the first year, graduate students planning to continue through the Ph.D. take essentially the same core program, as shown in the following specific suggestions of appropriate work in language and linguistics, literature, or German thought. This flexibility permits students to change direction at some later stage, as they develop intellectual identity on the basis of actual experience.

Under any concentration, electives chosen from graduate-level courses in German or approved courses in related fields must be added to accumulate the 36 units of study required for the A.M.

For basic University requirements see the "Advanced Degrees" section of this bulletin.

AREAS OF CONCENTRATION

Language and Linguistics—Students choosing this concentration should take the general survey courses 251 (Syntax of Modern German), 252 (Linguistics and the Analysis of German), and 253 (History of the Language) or their equivalents. In their further studies, students may choose courses in contrastive English-German linguistics, methods of teaching German, historical German dialects and comparative German linguistics, modern German syntax, phonology and dialectology, and theoretical synchronic and diachronic linguistics. Students are also encouraged to take related courses in other departments, especially in English and Linguistics.

During the first year, students normally take:

201, 202. Language and Style
211. Basic Structures of German and English
253. History of the German Language
or 252. Linguistics and the Analysis of German
255A. Middle High German
257. Gothic
or 258. Introduction to Old Norse
or 254. Old Saxon
or 256. Old High German

Three courses in German Literature and in German Thought, with at least one course in each.

Literature—Requirements are a minimum of two courses or seminars per quarter for at least four of the six quarters following the first year. Lecture courses and colloquia require final examinations but not term papers. Seminars, of which the student is expected to take a minimum of two after the first year, require research papers.

During the first year, students normally take:

201, 202. Language and Style
255A. Middle High German
Two courses in German Literature, preferably in the 330-series. One seminar in German Literature.
Two courses in German Thought, preferably Geistesgeschichte I and II.
One course in German Language and Linguistics.

German Thought — Requirements are a minimum of two courses or seminars per quarter for at least four of the six quarters following the first year, to include four courses or seminars at the 340 or 400 level and four courses or seminars at the 330 or 350-390 level. Lectures and colloquia require final examinations but not term papers. Seminars, of which the student is expected to take a minimum of two after the first year, require research papers. Students are advised to take some electives outside the department, related to their field of interest.

During the first year, students normally take:

201, 202. Language and Style
253. History of the German Language
or 251. Syntax of Modern German
or 252. Linguistics and Analysis of German
241. Deutsche Geistesgeschichte I
242. Deutsche Geistesgeschichte II
243. Deutsche Geistesgeschichte III

Three courses in German Literature, one of which should be at the 330 level and one at the 360, 370, or 380 level. One seminar in German Thought (340 level).

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.

COURSES OVERVIEW

General Courses (bearing the suffix A, given in English)
Introductory Language Courses (1-99)
Advanced Language Courses (100-199)
Thematic Advanced Language Courses (100-119)
Beginning Literature Classes (120-129)
Topics in German Studies (130-139)
Advanced Topics in Thought (140-149)
Linguistics (150-159)
Literature (160-169)
Culture (170-179)
Courses for Advanced Undergraduates and Graduates

(many courses also have a 300-level cross-listing):
Advanced Language Skills (200-209)
Literature and Culture (230-239)
German Thought (240-249)
Linguistics and Older Languages (250-259)
Major Authors (260-269)
Genres (270-279)
Major Works (280-289)
Special Topics (290-299)
Courses for Advanced Graduate Students (400-499):
Seminars and colloquia on special topics
Interdepartmental courses
Independent Study:
Undergraduates (199)
Graduates (298)
A.M.-level qualifying paper (301)
Dissertation research (400)

GENERAL (GIVEN IN ENGLISH)

These courses do not require a knowledge of German and are open to all students. German majors taking these courses as a part of their requirements must do the assigned reading in German.

7A, 8A, 9A. Myth and Modernity — (Offered jointly with the Department of Classics.) This sequence fulfills the Cultures, Ideas, and Values requirements. It examines myth and narrative as central structures of meaning in traditional and contemporary societies, introducing fundamental problems in cultural interpretation and encouraging a critical rethinking of cultural assumptions. Texts are drawn from philosophy, literature, and the other arts, including film and music. One lecture per week and two two-hour discussion sections.

7A. Literature — (Enroll in Classics 7A.) Representations and competing versions of three key myths: origins, motherhood and matriarchy, and salvation. DR:1 (three-quarter sequence)
5 units, Aut (Gleason, Maurizio, Stephens)
T1J plus section

8A. Logos — The problem of the enlightenment as conceptual thought between reason and terror, the costs of progress and generational conflict, knowledge and violence, the discontent with theory. Readings from Plato, Kant, Schiller, Hegel, Marx, Nietzsche, Freud, Kafka, Mann. DR:1 (three-quarter sequence)
5 units, Win (Berman) T11 plus section

9A. Language — The development of the modern understanding of language and the ways in which language, thought, and culture are intertwined; the origins of language; rhetoric, narrative, and poetry; intercultural translation; communication and power. Readings from
Aristotle, Hobbes, Humboldt, Coleridge, Adorno, Foucault. DR:1 (three-quarter sequence)
5 units, Spr (Mueller-Vollmer, Robinson)

T11 plus section

31A-33A. German Culture and Civilization I-III—(See also 131-133.) Aspects of modern society and culture in the countries of German-speaking Europe: social processes and institutions, modernism in literature and the fine arts, central concerns of philosophical and social thought. Students may enroll in any part of the series.

31A. Central Europe: Geography, Institutions, and Society—(Same as 131.) Survey of geography, people, and institutions of the German-speaking areas of Central Europe—contemporary situation and historical origins. Topics: recent developments in Central Europe (Mitteleuropa)—the “German Question;” Germany, Austria, and the nations of E. Central Europe; changes in the political geography since 1871; governments and political parties in Germany, Austria, and Switzerland. Social structure and demographic changes—Flüchtlinge, Aussiedler, Umsiedler, Gastarbeiter; Central Europe and the European Community; restructuring the Educational System. The German language—standard and dialects. DR:9(5)
3 units, Aut (Lohnes)

78A. The Germans: Who Are They?—Open to sophomores only. Identifies the Germans by examining historical roots of their attitudes, traditions, and political, cultural, and historical institutions. Looks at the burden of the past and issues confronting the unified Germany. Contact Dialogues and Seminars office for application and information.
2 units, Spr (Petig)

175A. From Gutenberg to Volkswagen—(Same as 175; History of Science 148.) Surveys the rich interaction of material life, technology, and culture in Germany, beginning with the emergence of print culture and emphasizing developments since 1850. Topics: the Industrial Revolution, mechanization, urban development, new means of transportation and communication, “Americanization,” technological heroes and crazes, military technology, the symbology of progress, and anti-technological movements.
4 units, Spr (Lowood)

246A. German Dramas of Revolution and Theories of Revolution—Possible plays: Götz, Tell, Danton, Napoleon, Die Weber, a 19th-century SPD play, Gas, Masse-Mensch. Theories and accounts of revolution (Schiller on the French Revolution, Marx, etc.) Readings in German or English.
3-5 units, Spr (Kenkel)

273A. The Modernist Novel I: Fin de Siècle to World War I—(Same as 373.) Readings: Mann, Buddenbrooks, Death in Venice; Gide, The Immortalist; Joyce, Portrait of the Artist; Proust, Swann’s Way, In a Budding Grove.
3-5 units, Win (Gillespie)

278A. The Modernist Novel II: The Roaring Twenties—(Same as 378.) Readings: Hemingway, The Sun Also Rises; Proust, Time Refound; Mann, The Magic Mountain; Joyce, Ulysses.
3-5 units, Spr (Gillespie)

293A. Gendered Perspectives: Literature, Criticism, Theory—(Same as 293/393.) The relationship between gender and genre. Topics: feminism’s impact on theory, essentialism vs. historicism, positionality and politics, problems of grounding, feminism and deconstruction, who can “do” women’s studies? Readings from Salomé, Freud, Weininger, Irigaray, Cixous, Kristeva, Spivak, Derrida.
3-5 units, Win (Knodt)

333A. Seminar in European Romantic Drama—(Same as 333.) The psychohistorical lineaments of “modern” archetypical protagonists and antiheroes, including Satan, Oedipus, Hamlet, Faust, and Don Juan; Romantic irony and paradigm shifts leading to epic and absurdist drama. Authors: Byron, Shelley, Goethe, Kleist, Büchner, Grabbe, Musset.
3-5 units, Spr (Gillespie)

INTRODUCTORY

First- and second-year language courses are under the direction of Professor Lohnes.

Note — Students registering for the first time in a first- or second-year course must take a placement test if they have studied German before entering Stanford.

FIRST-YEAR

1, 2, 3. German Language and Culture—Comprehensive, balanced introduction to listening and speaking, and reading and writing.
5 units, Aut, Win, Spr (Staff)

1X. Accelerated German for the Berlin Program—Enables students going to Berlin to satisfy the two-quarter language requirement in one quarter. Equivalent to German 1 and 2.
8 units, Win (Staff)

2C. Conversational German—Recommended for students going to the Stanford Center in Berlin. Enables students to understand and express themselves in simple spoken German, focusing on life in Germany. Materials from Berlin are the basis of instruction. Prerequisite: at least one quarter of first-year German.
2 units, Aut, Win, Spr (Staff)
4. Review of First-Year German — For those who need to solidify their basic command of the language and/or have not had contact with the language for a considerable period of time.
    3 units, Aut (Petig)

5. Intensive First-Year German — Equivalent of 1, 2, and 3 combined. Enrollment limited.
   12 units, Sum (Staff)

10. Elementary German for Seniors and Graduate Students — Intensive course designed for students who need to acquire reading ability in German for the Ph.D. and/or for advanced research in their own field. No auditors.
   4 units, Win, Sum (Petig)

11P. Individually Programmed Beginning German — For those who wish to complete more or less than 5 units a quarter, have a spotty background, have scheduling conflicts, or prefer to work independently. Students proceed at their own pace, working on their own with the text and tapes. The instructor is available for consultation on a regular basis. Conversation classes may be attended for listening and speaking practice.
   3-12 units, Aut, Win, Spr (Staff)

HAUS MITTELEUROPA

20A. Beginning Conversation
   1 unit, Aut, Win, Spr (Staff)

20B. Intermediate Conversation
   1 unit, Aut, Win, Spr (Staff)

20C. Advanced Conversation
   1 unit, Aut, Win, Spr (Staff)

20L. Speaker's Series
   1 unit, Aut, Win, Spr (Staff)

20M. Filmkunst aus Mitteleuropa
   1 unit, Aut, Win, Spr (Staff)

20T. Teaching German Conversation
   1 unit, Aut, Win, Spr (Staff)

20V. Video Series
   1 unit, Aut, Win, Spr (Staff)

20X. Meet the Mitt — (For Haus residents only.)
   1 unit, Aut, Win, Spr (Staff)

Other in-house courses will be announced.

SECOND-YEAR

21. Intermediate German I — Continues the balanced approach of 1, 2, and 3, including the systematic review of German structure and the reading and discussion of short prose texts. Prerequisite: 3 or 4.
   3 units, Aut, Win, Spr (Staff)

21C. Intermediate Conversation — Builds confidence and fluency by practicing communication strategies in everyday situations. Good preparation for overseas. Role playing, small group activities, visits with native speakers, tapes, interactive video.
   Prerequisite: 3 or the equivalent.
   3 units, Aut, Win, Spr (Staff)

22. Intermediate German II — Continuation of 21, with greater emphasis on reading and writing skills. Final course in the introductory sequence. Suggested continuation: 21C, 101, 105, 130, or 15Q series. Prerequisite: 21.
   4 units, Aut, Win, Spr (Staff)

52D,E,F. Readings in Other Disciplines — Open to undergraduates and graduate students. For students with a knowledge of German (one year or equivalent) who want to acquire reading proficiency in various disciplines. Excerpts from scholarly works and professional journals. Students may introduce material they need to read for their course work or research. Some departments accept the course in lieu of the Ph.D. reading exam.

52D. Readings in Political Science and International Relations
   3-4 units, Aut (Staff)

52E. Readings in Music and Music History
   3-4 units, Win (Staff)

52F. Readings in Philosophy and Religious Studies
   3-4 units, Spr (Staff)

INTERMEDIATE

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, Aut, Win (Staff)

105. Advanced Language Study I — Short fictional and expository texts read and discussed. Short essays. Exercises on points of grammar, idiomatic usage, and word distinctions. Guided conversations based on material.
   3-4 units, Win (Turneaure)

102. Advanced Language Study II — Continuation of 101.
   3-4 units, Spr (Turneaure)

108. Business German — Readings/discussions on German texts dealing with the business world, i.e., economics, banking, stock market, import-export trade, Common Market. Written exercises. Audio- and videotapes for listening comprehension and guided conversations. Prerequisite: 22 or equivalent.
   3-4 units, Spr (Petig)

110. German Newspapers — Articles of current interest in German newspapers read and discussed in German. May be taken twice for credit. Prerequisite: 22 or equivalent.
   3 units, Aut, Spr (Strachota)
111. Television News from Germany — Aim is listening comprehension of contemporary German video material and as an introduction to current events in Germany. Students listen to several German newscasts per week, analyzed and discussed in class; also, feature films two or three times during the quarter. In German  
2 units, Win (Staff)

120. Modern Short Prose — Short prose texts from Bachmann, Böll, Brecht, Kafka, T. Mann, Rilke, Wolf, and others. Emphasis is on readings that reflect historical events and cultural tendencies of 20th-century Central Europe. In German. DR:7(2)  
4 units, Aut (Turneaure)

122. German Literature: Poetry, Prose, and Drama from 1770 to the Present — Introduction to key concepts of major literary periods and literary criticism. Readings by Brecht, Büchner, Eichendorff, Frisch, Goethe, Heine, Hoffmann, Hölderlin, Kafka, Kleist, Thomas Mann, Nietzsche, Novalis, Rilke, Schiller, and Wolf. In German. DR:7(2)  
4 units, Spr (Turneaure)

131. Central Europe: Geography, Institutions, and Society — (Same as 31A.) Prerequisite: 22, or consent of instructor. DR:9(5)  
4 units, Aut (Lohnes)

134. Post-WWII German Film: Literaturverfilmungen — Focus is on the New German cinema filmmakers as an introduction to their filmmaking and their aesthetic concerns. Films based on literary works, such as Nosferatu, Katharina Blum, Mephisto, Woyzeck, Effi Briest, Macht der Gefühle, The Handmaid’s Tale, etc. Formal differences between the media and between literary and film analysis. 3-5 units, Spr (Kenkel)

137. Filmic Constructions of “The Primitive” — Explores Anglo-American romances with the “primitive.” Representative films (Tarzan the Ape Man, King Kong, King Solomon’s Mines, Out of Africa, Gorillas in the Mist, Dances with Wolves, The Piano), novels by Burroughs, Conrad, Haggard, and Dinesen, and critical studies by Donna Haraway, Marianna Torgovnich, Mary Louise Pratt, and Edward Said. 3-5 units, Win (Rentschler)

139. Introduction to the German Dialects — (Same as 259.) Survey of many of the major dialects of German-speaking Europe through texts, tapes, lectures, and presentations by native speakers; introduction to some basic principles of dialect geography. DR:9(4)  
3 units, Win (Robinson)

168. Reading German Poetry: 17th-18th Centuries — (Same as 272.) Major poets, stylistic waves, and characteristic themes from the Baroque to Storm and Stress experienced through specific texts. 3-5 units, Aut (Gillespie)

175. From Gutenberg to Volkswagen: Technology and Culture in Germany — (Same as 175A, History of Science 148.)  
4 units, Spr (Lowood)

199. Individual Reading — 36 hours of reading per unit, weekly conference with instructor. May be repeated for credit. Enrollment by consent of the department. Prerequisites: 22, consent of instructor. 1-2 units, Win, Spr (Petig, Staff) by arrangement

ADVANCED UNDERGRADUATE AND GRADUATE

201. Language and Style — Students write weekly one-page compositions, each on a different level of style, e.g., written representation of spoken language, informal and formal letters, journalistic and expository prose, and fiction. Examples are read and discussed, and grammatical problems analysed. In German  
2 units, Win (Lohnes)

202. Language and Style — Continuation of 201.  
2 units, Spr (Lohnes)

211. Basic Structures of German and English — Survey of the main features of German syntax, contrasted with English. Material is from the Stanford Corpus of Spoken German.  
3 units, Aut (Lohnes, Petig)

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.  
241-243. The history of German thought from 1750 to the present and its significance for an understanding of modern culture. Authors: Adorno, Freud, Herder, Hegel, Husserl, Marcuse, Marx, Nietzsche, Schiller, and Wittgenstein. In English  
3-5 units, Aut (Kenkel)

241. Deutsche Geistesgeschichte I — Language and thought from Leibniz to Humboldt, focusing on the emergence of a new aesthetic during the Enlightenment corresponding to ideas about a new type of Publikum comprising autonomous, rational subjects. Plays, political, and cultural theory, philosophy, and historical/cultural background texts. 3-5 units, Aut (Kenkel)

242. Deutsche Geistesgeschichte II — Cultural theory and historical meta-narrative from Romanticism to the Modernist threshold. Texts by Novalis, Hegel, Schopenhauer, Feuerbach, Marx, Stirner, and Nietzsche. Readings in German (or in translation for generalists). 3-5 units, Win (Gillespie)
3-5 units, Spr (Mueller-Vollmer)

246. German Dramas of Revolution and Theories of Revolution — (Same as 246A.)
3-5 units, Spr (Kenkel)

247. Cultural Poetics: History and Literature from Historical Perspectivism to New Historicism — (Same as 347.) Current theory in historical discourse, especially New Historicism and New Cultural History, was anticipated by Chladenius, Lessing, Herder, F. Schlegel, Droysen, Nietzsche, Dilthey, Cassirer, and Benjamin. Seminar (texts and discussions in German) on their ideas within a larger anthropological concept of German Studies.
3-5 units, Aut (Seeba)

248. Readings in Classical Film Theory — (Same as 348.) Questions and concepts of classical film theory, with an emphasis on central figures, key debates, and their pertinence for current discussions about film, spectatorship, gender, and mass culture.
3-5 units, Win (Rentschler)

251. Introduction to the Runes — Survey of “texts” in the earliest Germanic writing system, origins and uses of runes, grammatical analysis of the surviving inscriptions, the importance of Runic in the grouping of the Germanic languages. Emphasis is on the oldest inscriptions (in the “Older Futhark”). Review of younger, more distinctly Scandinavian inscriptions (in the “Younger Futhark”).
3-5 units, Win (Robinson)

253. History of the German Language — The historical background of the modern German language. 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, Aut (Robinson)

254. Old Saxon — Introduction to the grammar and texts of this earliest stage of Low German and a close relative of Old English.
3-5 units, Aut (Robinson)

259. Introduction to the German Dialects — (Same as 139.) Survey of the major dialects of German-Speaking Europe, through texts, tapes, lectures, and presentations by native speakers; introduction to some basic principles of dialect geography.
3 units, Win (Robinson)

261. Carolingian Literature — (Same as 361.) Readings in Latin and vernacular texts of the Carolingian period, ca. 800-900. Prerequisite: intermediate reading knowledge of Latin.
3-5 units, Win (Andersson)

272. Reading German Poetry: 17th-18th Centuries — (Same as 168.)
3-5 units, Aut (Gillespie)

279. German Naturalism and the Late-19th Century Aesthetic Debate in Germany — Lyric poetry, the “Berlin-novel,” novellas, plays, and naturalist aesthetic theory. The intellectual influences on the naturalists, including Ibsen and Zola, Nietzsche, positivism, and Darwinism, examining how and why the naturalist movement was seen as a form of aesthetic revolution in Germany.
3-5 units, Win (Kenkel)

293. Gendered Perspectives: Literature, Criticism, Theory — (Same as 293A, 393.)
3-5 units, Win (Knodt)

294K. Women in German Culture around 1800 — (Same as 394.) The impact of Romantic women writers on the literary culture of the late 18th century against the historical, political, and intellectual background of the age. Readings by Karoline von Günderode, Dorothea Schlegel, Henriette Hertz, Bettina von Arnim, Kant, Hippel, Fichte.
3-5 units, Spr (Knodt)

298. Individual Work — Open only to German majors and to students working on special projects. Honors students use this number for the honors essay. May be repeated for credit.
1-15 units each quarter (Staff) by arrangement

300. Methods and Materials for German Studies — Techniques and library resources for investigating the historical dimensions and settings of German culture. Readings/assignments explore multiple aspects of the production of texts in historical context, emphasizing the location and interpretation of relevant cultural, economic, social, and scientific sources. Non-canonical and extra-literary sources; film and other non-print media; archival collections.
3 units, Win (Lowood)

301. Individual Work — Primarily for work on the A.M.-level qualifying paper.
units by arrangement (Staff)

302. Methods of Teaching German — (Same as Education 291.) Overview of teaching methodologies and approaches; observation of classes and discussion of classroom practices; analysis and evaluation of materials.
3 units, Aut (Petig)

333. Seminar in European Romantic Drama — (Same as 333A.)
3-5 units, Spr (Gillespie)
347. Cultural Poetics: History and Literature from Historical Perspectivism to New Historicism—(Same as 247.)
3-5 units, Aut (Seeba)

348. Readings in Classical Film Theory—(Same as 248.)
3-5 units, Win (Rentschler)

3-5 units, Aut (Mueller-Vollmer)

361. Carolingian Literature—(Same as 261.)
3-5 units, Win (Andersson)

371. Old Norse Poetry—Readings in Eddic and skaldic verse 850-1250. Prerequisite: some reading knowledge of Old Norse.
3-5 units, Win (Andersson)

373. The Modernist Novel I: Fin de Siècle to World War I—(Same as 273A.)
3-5 units, Win (Gillespie)

378. The Modernist Novel II: The Roaring Twenties—(Same as 278A.)
3-5 units, Spr (Gillespie)

379. German Naturalism and the Late-19th Century Aesthetic Debate in Germany—(Same as 279.)
3-5 units, Win (Kenkel)

393. Gendered Perspectives: Literature, Criticism, Theory—(Same as 293A, 293.)
3-5 units, Win (Knodt)

394. Women in German Culture around 1800—(Same as 294K.)
3-5 units, Spr (Knodt)

ADVANCED GRADUATE

400. Dissertation Research—Exclusively for graduate students in German working on dissertations.
1-12 units, Aut, Win, Spr, Sum (Staff) by arrangement

AFFILIATED DEPARTMENT OFFERINGS

COMPARATIVE LITERATURE

40. Modernism, Fascism, and Technology
3-5 units, Aut (Pridmore-Brown)

60. The Representation of Reality in Fiction and History
5 units, Win (H. White)

291E. Sport and Culture—(Same as French and Italian 291E.)
5 units, Win (Gumbrecht, Schnapp)

349. Graduate Seminar: Narratology—Myth, Fiction, and History—(Same as French and Italian 349E; Spanish 394.)
3 units, Win (H. White)

369. Philosophies of Form—(Same as French and Italian 295E.)
5 units, Aut (Gumbrecht, Schnapp)

PHILOSOPHY

135/235. Traditional and Contemporary Concepts of Culture
4 units, Aut (Welsch)

176A. Current Questions in Aesthetics
3 units, Win (Welsch)

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.

3B. German Language and Culture—Berlin. Offered depending on demand.
6 units, Aut, Win, Spr (Rohr, Biege)

22B. Intermediate German—Berlin.
4 units, Aut, Win, Spr (Wohlfeil)

101B. Advanced German—Berlin.
4 units, Aut, Win, Spr (Friesel-Kopecki)

129E. Modernism and Metropolis: Turn-of-the-Century Culture in Berlin—Berlin. DR:7(2)
4 units, Aut (Schutte)

134B. An Introduction to Modern German Cinema—Berlin.
4 units, Win (Rehm)

166B. Women, Literature and Transitions in Germany—Berlin.
4 units, Win (Hoernigk)

4 units, Spr (Hoernigk)

174B. Greek Tragedy and German Culture: An Artistic Symbiosis—Berlin.
4-5 units, Win (Rehm)

177A. Culture and Politics in Modern Germany—Berlin. DR:9(5)
4 units, Win (Kramer)

177B. Nationalism and Political Culture in Contemporary Germany—Berlin.
4 units, Aut (Tempel)
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.

**UNDERGRADUATE PROGRAMS**

**BACHELOR OF ARTS**

The program for the undergraduate major emphasizes both breadth of training and concentration of studies in a selected field of history.

As foundation requirements, 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 letter grade indicator (LGI) of 'C' or higher; (2) complete four small group courses including one introductory 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 (at least eight pages) in at least eight approved history courses. 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 “pre-modern” 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 “pre-modern” chronological period may also count for fields I-III.

To develop some measure of expertise and to provide the student’s course of study with both a focus and a destination, four courses (of which one must be a small group course in addition to the undergraduate research seminar) must be taken in one of the following fields of concentration: Africa, Asia, Eastern Europe and Russia, Europe before 1700, Europe since 1700, Latin America,
the United States, Middle East, or a thematic subject treated comparatively, such as war and revolution, work, gender, family history, popular culture/high culture, etc. 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.

Since History majors are required to complete an introductory seminar exposing students to the practices of the historian and an undergraduate research seminar in which the student conducts research, completion of the major requires planning. Following consultation with their adviser, majors must file a plan of study 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 take 12 to 15 units of honors work, excluding the colloquium, to be distributed as best fits their program. Because students in the honors program conduct a year-long program of independent research, they are not required to take an undergraduate research seminar.

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 LGI 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 admits each year a limited number of undergraduate History majors to work for coterminal A.B. and A.M. degrees in History. Applications for admission should be submitted by Feb 15th of the junior 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 LGI 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, etc.). 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 in 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 "Advanced Degrees" section in 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)
   - The Ancient Greek World
   - The Roman World
   - Europe, 300-1000
   - 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

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, 300-1000
      - 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
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.

JOINT Ph.D. IN HISTORY AND HUMANITIES

The Department of History participates in the Graduate Program in Humanities leading to a joint Ph.D. degree in History and Humanities. See the “Humanities Special Programs” section of this bulletin.

RESOURCES

The above section relates to formal requirements, but the success of a student’s graduate program depends in large part on the quality of the guidance which he or she receives from the faculty and on the library resources available. Prospective graduate applicants are advised to study closely the list of History faculty and the course work which this faculty offers. As to library resources, no detailed statement is possible in this bulletin, but areas in which library resources are unusually strong are described below.

The rich, and in some respects unique, collection of the Hoover Institution on the causes, conduct, and results of WWI and WWII 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 WWI 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 interna-
tional 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 WWII); 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.

COURSES

See the Time Schedule for changes in course offerings each quarter. The department also maintains a bulletin board with updated information.

INTRODUCTORY

1, 2, 3. Europe: From Antiquity to the Present — Introduction to the economic, political, and social history of 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 I 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? DR: 1 (three-quarter sequence)

5 units, Aut (Buc) lectures MTW 9 plus two-hour colloquium

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. DR: 1 (three-quarter sequence)

5 units, Win (Lougee, Rakove) lectures MTW 9 plus two-hour colloquium

3. Europe: 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. DR: 1 (three-quarter sequence)

5 units, Spr (Naimark) lectures MTW 9 plus two-hour colloquium

24A. Russian Civilization from 9th to 17th Centuries — Interdisciplinary approach to Russian history and culture; examines literature, society, institutions. DR: 2(*) or 9(*)

5 units, Aut (Kollmann) MTWTh 10

24B. Russian Civilization II: 18th to 20th Centuries — Interdisciplinary approach to Russian history and culture; examines literature, society, institutions.

5 units (Emmons) not given 1994-95

50. African-American Alternative Film

1 unit, Aut (Carson) T 8-10 p.m.

80. Culture, Society, and Politics in Latin America — Introduction to the economic, political, and social history of Latin America since the 15th century. Emphasis is on the interaction between economic change, social structure, and political movements, concentrating on the histories of Mexico, Brazil, and Argentina, and other national experiences. DR: 9(*)

5 units (Haber) not given 1994-95
INTRODUCTORY 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, in constructing a coherent story from them, in 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.”

14S. Introductory Seminar: Apocalypse Now and Then – Apocalyptic Thought in Medieval Europe — “Prepare, for the world is coming to an end!” A religious statement or a call to social and political action? In the Middle Ages, either. The origins, development, and “uses” of medieval apocalyptic and millenarian thought, using the Scripture, learned treatises, “biographies” of Antichrist, plays, and art. Topics: Jewish apocalypticism, Christian expectations of the End, the figure of Antichrist, opponents of millenarianism, and the uses of apocalyptic language against the Muslims, for political rhetoric, and as a vehicle for radical social criticism. Modern uses of apocalyptic language.

5 units, Aut (Smoller) Th 1:15-3:05

15S. Introductory 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.

Dr: 9(S)

5 units (Buc) not given 1994-95

16S. Introductory Seminar: The Society of Renaissance Florence – Takes the beginning student into the historian’s workshop and provides first-hand experience in interpreting documents, constructing a coherent story from them, and in discovering why it is possible to agree on the facts but not to agree on what they mean. Florentine documents of the Renaissance, from census records to court records, letters, and diaries are analyzed with the help of computers. Students develop their own interpretations of what Florentines were like. Emphasis on social structure and everyday people.

5 units, Spr (Brown) Th 1:15-3:05

25S. Ivan the Terrible in Russian Historiography – Uses primary sources from 16th-century Russia, in translation, and secondary works from 19th- and 20th-century historians to explore views of Ivan; students prepare their own interpretation of Ivan and analysis of historiography in research essay.

5 units (Kollmann) not given 1994-95

31S. Introductory Seminar: The France of Louis XIV – The Annales historians’ particular “menage a trois” (source, problem, technique) for transforming the past into history. Issues: the chances of escaping starvation, how people “made it” during the Old Regime, Foucquet’s guilt or innocence, what mattered at the court, why peasants rebelled, how people lived their religion. Prerequisites: 1, 2, 3, or equivalent year-long survey course in European history.

5 units, Spr (Lougee) T 1:15-3:05


5 units (M. L. Roberts) not given 1994-95

40S. Introductory Seminar: British Narratives of the Great War – How the “history” of WWI developed and changed. Uses memoirs, autobiographical novels, and other narratives of the war (by men and women) to assess how gender, social structures, class, and other factors affect how experiences are described and presented, and how these images change over time. Readings from Robert Graves, Vera Brittain, etc.

5 units, Win (Staff) Th 1:15-3:05

41S. Medicine and Society in Early Modern England – 16th- and 17th-century medicine differed in its views of illness, treatments, and practitioners. Orthodoxy did not control medical practice nor was illness confined to institutions. Advice books, diaries, statues, and bills of mortality help to reconstruct early modern experiences of health and illness.

5 units, Spr (Staff) W 1:15-3:05

43S. Introductory Seminar: Preventing Revolution – Political Rhetoric and Parliament in 19th-Century Britain — In a period of unparalleled social, economic, and political change, most 19th-century Britons viewed Parliament as one of the few institutions that could hold together a society riven by tensions. The rhetoric of members of Parliament and outside groups trying to influence Parliament (Chartists, feminists, critics of imperialism, and journalists). Their shared assumptions and language.
Readings: secondary texts and primary sources (parliamentary debates, newspapers, diaries, and novels).

5 units, Aut (Staff) T 1:15-3:05

45S. Industrialization and its Discontents: Reform in Early Victorian England — The problem of social reform in Early Victorian England through case studies. For each “social problem,” students look at a variety of primary and secondary sources including monographs, tracts, Parliamentary debates, novels, and biographies and attempt to reconstruct both sides of each issue.

5 units, Win (Staff) W 1:15-3:05

46S. Introductory Seminar: African Resistance Movements in the Colonial Era — African responses to colonialism using case studies from east, west and southern Africa. Scholarly debates surrounding the topic of resistance and accommodation through case studies. Large-scale military resistance and subtle responses to European domination, including women’s movements, cultural resistance, and separatist churches.

5 units, Win (Staff) T 1:15-3:05

56S. Introductory Seminar: Advertising and Consumer Culture in the United States — The history of modern materialism through the study of advertising. Introduces 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, Spr (Corn) W 1:15-3:05

58S. Introductory Seminar: Women in the Modern African-American Freedom Struggle — Participate in the research of the Martin Luther King, Jr. Special Project, with emphasis on the role of women.

5 units (Carson) not given 1994-95

65S. Introductory Seminar: American Conservatism since 1945 — The history of American conservative political culture from 1945-1988. Emphasis is on the changing nature of conservatism, the major phases of conservative thought and action, and conservatism as a social, political, and cultural movement. Use of primary documents such as contemporary historical analyses, films, government records, literature, speeches, letters, political and social tracts, and journalistic impressions. Topics: McCarthyism, the radical Right, grass-roots conservatism and Goldwater, the Right and race, and the Reagan revolution.

5 units, Win (Staff) Th 1:15-3:05

70S. Asian American Women’s History — The representations, experiences, and consciousness of Asian American women from the mid-19th century to the present. Use of primary sources (oral histories, immigration records, literature, and newspaper accounts). The intersection of racial, national, class, and gender identities in various Asian American subgroups. Topics: emigration/immigration, family and gender dynamics, work experiences, and community/political activism.

5 units, Win (Wu) W 1:15-3:05

77S. Introductory Seminar: Frontiers and Transfrontier Regions in the Americas

5 units, Aut (Wirth) T 3:15-5:05

85S. Introductory Seminar: Jews and Moslems — The relationship between Jews and Moslems from the earliest times until the middle of the 20th century. The religious, political, and social aspects of this evolving relationship examined through the analysis of primary documents in translation. Themes: early Islam and the Jews, the “Golden Age” in Spain, Jews in the Ottoman Empire, Jews and Moslems in the Age of Imperialism, the end of Jewish life in the lands of Islam in the 20th century.

5 units (Rodrigue) not given 1994-95

95S. Introductory Seminar: Imperialism, Colonialism, and Nationalism in Modern Korea, 1876-1945 — Korea’s transformation from a traditional to a modern nation through primary sources (government publications, contemporary periodicals, international agreements, memoirs, travel accounts, and treatises), in tandem with more recent scholarship.

5 units, Spr (Staff) M 1:15-3:05

98S. Introductory Seminar: The Institutions of Early Medieval Japan — The history and institutions of early medieval Japan from the perspective of documents in translation. Series of short papers required in which individual documents are analyzed. Subjects: family, law, gender, and justice in the era of Japan’s first shogunate.

5 units (Mass) not given 1994-95

ADVANCED UNDERGRADUATE

100 through 199 are primarily lecture courses. The Sophomore Dialogues and Seminars Program provides opportunities for second-year students to work closely with faculty as they explore their potential or recently-declared major course of study. All Dialogues Tutorials and some Peters Seminars require a brief application. Refer to the Time Schedule or contact the Dialogues and Seminars office (123 Sweet Hall, telephone 415-723-4504) for applications and information.

HISTORY OF TECHNOLOGY

115. Technology and Culture in 19th-Century America — (Same as History and Philosophy of Science 121; Science, Technology, and Society 121.) Social and cultural aspects of technological change from the American Revolution through WWI. Emphasis 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). DR:9(5)
4-5 units, Win (Corn) TWTh 10
discussion section for 5 units

EASTERN EUROPE AND RUSSIA

119. Aristocracies and Absolutism: Early Modern Eastern Europe, 1300-1800 — Societies and culture of E. Europe (Belorussia, Bolemia, Hungary, Poland, Ukraine) in the late medieval and early modern periods. The conflict of aristocratic parliamentary governments with absolutist states (Austria, Hungary Prussia, Russia). Eastern Europe's development contrasted to the Russian historical experience. DR:9(5)
5 units (Kollmann) not given 1994-95

120. Russia in Revolution, 1861-1930 — Russian history from the abolition of serfdom to the first Soviet five-year plan and the collectivization of agriculture. The Russian Revolution of 1917 considered in this broader context. DR:9(5)
5 units (Emmons) not given 1994-95

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 culture, changing family and social patterns, government attitudes toward Jews, perceptions of Jews in Russian 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 1994-95

125. 20th-Century Eastern Europe — Major historical trends in 20th-century E. European history. Empires and national movements. The creation of independent Eastern Europe after WWI; social movements and the emergence of dictatorship and fascism in the interwar period. WWII, Stalinism, and de-stalinization in contemporary Eastern Europe.
5 units, Aut (Naimark) MTWTh 11

MEDIEVAL AND RENAISSANCE EUROPE

109. The Renaissance — DR:9(5)
5 units, Win (J. Brown) MTWTh 11

111. The Black Death and Medieval Responses to Plague: The AIDS of the 14th Century — (Same as Human Biology 158, History and Philosophy of Science 111.) What is the legacy of epidemic disaster? The plague that killed one-third of Europe's population in 1348-49 and continued to haunt Europe through the 17th century. The modern experience of AIDS. How the experience of plague transformed the economy, society, thought, and practice of medicine. The impact of plague on modern thought in inspiring a history in which the major players are microbes and rats; and as metaphor (in Camus's The Plague and Bergman's The Seventh Seal).
5 units, Spr (Smoller) MTWTh 10

WESTERN EUROPE

127D. 20th-Century Germany — The political, social, economic, and cultural developments of "Germany" from the eye of WWI to the 1990 unification. Germany's search for political democracy and national identity. DR:9(5)
5 units, Win (Sheehan) TTh 1:15-3:05

130. From Enlightenment to Revolution: France in the 17th and 18th Centuries
5 units, Spr (Baker) TTh 10

134. Modern Italy
5 units, Win (Segré)

5 units (Robinson) not given 1994-95

136B. European Thought in the 20th Century — The important European thinkers and intellectual movements of the 20th century, from Freud to Foucault.
5 units, Win (Robinson) MTWTh 10

137. The Holocaust — The emergence of modern racism and radical antisemitism. The Nazi rise to power and the Jews. Antisemitic legislation in the 1930s. WWII and the beginning of mass killings in the East. Deportations and ghettos. The mass extermination of European Jewry. DR:9(5)
5 units (Rodrique) not given 1994-95

HISTORY AND PHILOSOPHY OF SCIENCE

133. The Darwinian Revolution — (Same as History and Philosophy of Science 152; Human Biology 152; Philosophy 152; Science, Technology, and Society 130.) Conceptual developments leading to establishment of the major unifying paradigm of biological science, the theory of evolution by natural selection. Biological thought before Darwin (1750 to 1836). Formation of Darwin's thought in terms of its broader intellectual and social context. The Origin of Species. Difficulties the theory had to overcome and their resolution in the union of evolutionary biology and population genetics. DR:9(4)
4 units (Staff) not given 1994-95

133A. The Rise of Scientific Medicine — (Same as History and Philosophy of Science 154, Human Biology 151.) Intellectual, social, and institutional dimensions of the rise of scientific medicine in the
19th century. How did medicine become “scientific?” What differences did it make to the physician? Why did it display other approaches to medicine? Focus is on France, Germany, and England from 1750 to 1912, and U.S. from 1890 to 1912. Development of experimental physiology and biomedical technology and their contributions to the medical revolution. Concrete relationships of scientific developments in physiology, pharmacology, and bacteriology and effects on medical practice and therapy. Patterns of professionalization of medicine in different nations. Were forces driving professionalization of medicine in these contexts the same or different? How did institutional structure of the medical profession differ, according to its local context?

4 units (Lenoir) not given 1994-95

133B. Undergraduate Colloquium: The Sociology of Scientific Knowledge — (Same as Anthropology 158, History and Philosophy of Science 155.) 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 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, Fujimura) not given 1994-95

133D. Origins of Life — (Same as History and Philosophy of Science 156.)

4 units (Thurtle)

134A. The Industrial Revolution: Historical and Cultural Perspectives — (Same as History and Philosophy of Science 141; Science, Technology, and Society 131.) The technological changes that constituted the Industrial Revolution in Europe and America within the context of social, political, economic, and cultural developments. The relevance of these historical studies by examining industrialization in Third World nations. DR:9(5)

5 units, Aut (Hecht) TTh 11-12:30

135A. The Nuclear Age — (Same as History and Philosophy of Science 142.) The historical implications of nuclear technology for post WWII society, focusing on relationships between nuclear technological development and political, economic, and cultural change. Topics: development of nuclear programs and how nuclear reactors and weapons work; regulation, risk and safety, policy, and public perception and protest. Covers nuclear programs in America and Europe, and material on the Middle East and S. America.

5 units (Hecht) not given 1994-95

138A,B,C. Introduction to Cosmology — (Same as History and Philosophy of Science 138A,B,C; Classics 138A,B,C; Philosophy 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, and more speculative aspects in natural philosophy and theology.

138A. Ancient Period — DR:8(3)
4 units, Aut (Knorr) MWF 2:15

138B. Cosmology: Middle Ages and Renaissance — DR:8(3)
4 units, Win (Knorr) MWF 2:15

138C. Modern Period: Newton to Einstein — DR:8(3)
4 units, Spr (Knorr) MWF 2:15

138D. Topics in the History of Mathematics: From Antiquity to the 17th Century — (Same as History and Philosophy of Science 140, Philosophy 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, Win (Knorr) TTh 2:15-3:30

139. Scientific Revolution — (Same as History and Philosophy of Science 145, Philosophy 145.) 17th-century philosophy and science. The development of science from Descartes to Newton. Emphasis is on basic physical concepts, celestial mechanics, scientific method, and the interplay between science and religion.
4 units (Staff) not given 1994-95

139A. History of Physics — (Same as History and Philosophy of Science 168.) Describes, analyzes, and interprets the major scientific changes which have characterized the 20th century. The introduction of the ideas of relativity, the surprising and pervasive role of quantum notions, rapidly alternating scientific fashions from nuclear physics to particle physics, from superconductivity to chaos. Emphasis on corresponding changes in sociology, demography, and the impact on philosophy and the changed role of physics in the 20th century.
5 units, Win (Staff) MTWTh 10

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. DR:9(5)
5 units (Seaver) not given 1994-95
142. Revolutionary England, 1603-1689 — DR:9(5)
5 units, Aut (Seaver) MTWTh 9

143. 20th-Century Britain — 20th-century British history including politics, society, and culture. Focus is domestic, emphasizing industrial decline, the social effects of total war, the development of the welfare state, and the evolution of popular culture during the post-war period. DR:9(5)
5 units, Spr (Stansky) TTh 1:15-2:30

AFRICA

144. Introduction to African History — African history from ancient Africa to the 1900s, from ancient societies, e.g., Egypt, to the democracy movement. What is history in Africa and how Africans see their past.
5 units (Jackson) not given 1994-95

144C. Africa in the 20th Century — DR:2(*)
5 units, Win (R. Roberts) MTWTh 10

145. Modern South Africa — The rise and fall of apartheid. Impact of the 19th-century mineral revolution, development of segregation and apartheid, growth of the liberation movement, the uneven road to democracy.
5 units, Aut (Gish) MTWTh 10

148. Introduction to African History — African history from ancient Africa to the 1900s, from ancient societies, e.g., Egypt, to the democracy movement. What is history in Africa and how Africans see their past.
5 units (Jackson) not given 1994-95

AFRICA

148. Introduction to African History — African history from ancient Africa to the 1900s, from ancient societies, e.g., Egypt, to the democracy movement. What is history in Africa and how Africans see their past.
5 units (Jackson) not given 1994-95

148C. Africa in the 20th Century — DR:2(*)
5 units, Win (R. Roberts) MTWTh 10

149. Africa since 1935 — The Fascist Italian occupation of Ethiopia in 1935, the growth of African nationalism, and the coming of WWII. The dynamics of this period, with highlights from the 1980s.
5 units (Jackson) not given 1994-95

149A. East Africa in History — Kenya, Uganda, Tanzania, Ethiopia, and Mozambique have had a rich varied, and tumultuous history. Their history, culture, politics, and future prospects, beginning with earliest human communities.
5 units (Jackson) not given 1994-95

THE UNITED STATES

152. Introduction to Material Culture — (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, Spr (J. Corn) TTh 1:15-3:05

154. Peace Studies — (Same as Political Science 133, Psychology 142, Education 173X, Sociology 108.) 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: illustrate the current and potential contributions of various academic disciplines and critical analyses to the study of peace, and prepare students to think critically and to act responsibly and effectively on behalf of peace. Lectures on how our world is changing, the nature of peace and peaceful processes, peace at the operational level (the causes of war, building negative peace, building positive peace); peace — moral and normative considerations; peace and you.
5 units, Spr (Bernstein, Bland, Drekmeier, Holloway, Moses, Noddings, Ross) MTWTh 1:15 and by arrangement

5 units, Aut (Carson) MTWTh 10

158. History of Education in the United States — (Same as Education 201.) Analysis of selected turning points in education in relation to religion, political socialization, race relations, gender, immigration, and urbanization.
3 units, Spr (Tyack) MW 11

158B. American Education and Public Policy — (Same as Education 105, Political Science 186K.) 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.
3 units, Aut (Kirst, Tyack) MW 2:15

159. Introduction to Asian American History — The historical experience of people of Asian ancestry in the U.S. Immigration, labor, community formation, family, culture and identity, and contemporary social and political controversies. Readings: interpretative texts, primary material, and historical fiction. Lectures and discussion. DR:3
4-5 units, Spr (Chang) MTWTh 10

164. Introduction to Race and Ethnicity in the American Experience — (Same as American Studies 164, Chicano Studies 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. DR:3
5 units, Spr (Fredrickson, Gutierrez) MTWThF 11-12:15

165A, B, C. United States History from the Revolution to the Present — General sequence emphasizing 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. Recom-
mended as a prerequisite for advanced work in American history.

165A. Colonial and Revolutionary America—In alternate years, emphasis is on the development of American society prior to the revolution (1994-95), or on the political and social history of the Revolutionary era.
5 units, Aut (Rakove) MTWThF 9

165B. 19th-Century America—DR:3
5 units, Win (Sawislak) MTWTh 11

165C. The United States in the 20th-Century—The major political, economic, social, and diplomatic developments in the U.S. since the end of the 19th century. Themes: debates over the proper economic and social role of government (the Progressive, New Deal, Great Society, and Reagan-Bush eras); ethnic and racial minorities in American society (during periods of mass immigration at the turn of the century and since 1965, and in the civil rights era of the 1950s and 60s); the changing status of women (since WWII); shifting ideological bases, institutional structures, and electoral characteristics of the political system (the New Deal and post-Vietnam eras); and the determinants of U.S. foreign policy (in WWI, WWII, and the Cold War). DR:3 or 9(5)
5 units, Spr (Kennedy) MTWTh 9

166. History of Higher Education in the U.S.—(Same as 366.) From the founding of Harvard in 1636 to the present, with emphasis on institutional development, governance, and evolving purposes and clientele.
3-5 units, Spr (Lyman)

172A. America since 1945—Analyzes foreign policy and politics, and deals with social themes and intellectual history. DR:9(5)
4-5 units, Win (Bernstein) MTWThF 1:15

173B. U.S. Women's History, 1820-1980—(Same as Feminist Studies 122.) 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. DR:9†(5)
5 units, Spr (Freedman) MW 1:15-3:05
plus one hour section

173C. Introduction to Feminist Studies—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. DR:9†(5)
5 units (Freedman) not given 1994-95

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 on achievement of political independence. DR:9(5)
5 units (Bowser) not given 1994-95

179. History of Mexico—Survey of 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. DR:9(5)
5 units (Bowser) not given 1994-95

180. 20th-Century Brazil—(Same as Latin American Studies 121.) Brazil is a continent-sized nation whose multi-ethnic society is at a crossroad as to 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. The Empire's demise in 1989, Brazil's rise as a middle range economic power, and the development of a dynamic national culture.
5 units, Spr (Wirth) MTW 9

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; Islamic philosophy and science; relations among Islam, Christianity, and Judaism; modern currents in Islam. DR:2(*)
5 units, Aut (Beinin) MTWTh 11

5 units, Win (Gupta, Mancall) MTWTh 10

187B. Middle East in the 20th-Century—Survey the history of the Middle East since WWI, focusing on the eastern Arab world, Egypt, the Fertile Crescent, and the Arabian Peninsula (The
187C. Women in the Contemporary Middle East — Survey of 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. DR:2† or 9t(5*)
5 units (Beinin) not given 1994-95

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 also 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. DR:9(S)
5 units, Win (Rodrigue) MWTTh 1:15

188C. Jews in the Modern World — Survey of 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. DR:9(S)
5 units, Spr (Zipperstein) MWTTh 10

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. DR:2(5*)
5 units (Mancall) not given 1994-95

190A. Economic History of the Middle East — Survey of economic development in the Middle East, focusing on the major themes of the region. DR:2(5*)
5 units, Win (Neskar) MWTThF 11

190B. Modern China, 19th and 20th Century — 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 People’s Republic of China to the present. Structured around political history. Attention to social, economic, and cultural currents. Recommended: 192A, 192B, or Political Science 115. DR:2(5*)
5 units (Van Slyke) not given 1994-95

190C. Modern Korea — Survey of Korean history in the 19th and 20th centuries. Topics: 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. Attention to social, economic, and cultural currents. Recommended: 192A, 192B, or Political Science 115. DR:2(5*)
5 units (Mancall) not given 1994-95

191. Modern Korea — Survey of Korean history in the 19th and 20th centuries. Topics: 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. Attention to social, economic, and cultural currents. Recommended: 192A, 192B, or Political Science 115. DR:2(5*)
5 units (Mancall) not given 1994-95

192A. Chinese History from the Earliest Times to the 9th Century — (Same as Asian Languages 156.) DR:2(5*)
5 units, Win (Neskar) MWTThF 11

192B. Chinese History from the Mongols to the 19th Century — From the late Tang to the Taiping Rebellion. Emphasis on socio-economic rather than the political history to expose students to a sophisticated society very different than their own. Recommended: 192A. DR:2(5*)
5 units, Spr (Kahn) MWTThF 11

192C. Modern China, 19th and 20th Century — 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 People’s Republic of China to the present. Structured around political history. Attention to social, economic, and cultural currents. Recommended: 192A, 192B, or Political Science 115. DR:2(5*)
5 units (Van Slyke) not given 1994-95

194A. Early and Medieval Japan to 1500 — Pre-historic origins of the people and culture, emergence of the first polity, Chinese influences, flowering of the native culture, the samurai, and feudal government. DR:2(5*)
5 units, Aut (Mass) MWTTh 9

194B. History of Japan, 15th-19th Century — 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. DR:2(5*)
5 units, Win (Ketelaar) MWTThF 10

194C. History of Japan, the 19th Century 5 units, Spr (Ketelaar) MWTThF 10

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. DR:2(5*)
5 units (Duus) not given 1994-95

196. Traditional East Asian Civilization: Japan — (Same as Asian Languages 92.) Perspectives on Japan’s traditional civilization by faculty from Art, Asian Languages, History, and Religious Studies. The intellectual methods of various disciplines in a common examination of traditional Japan, based on literary works, historical documents, religious texts, and art objects.
5 units, Win (Hare) MWTThF 2:15

197. Modern Korea — Survey of Korean history in the 19th and 20th centuries.
4-5 units, Win (Kim) TTh 1:15-3:05
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 to seminars and colloquia is by consent of the instructor.

200A,B,C. Senior Honors
units by arrangement (Staff)

200H. History Honors Colloquium
3 units, Spr (Sawislak) T 1:15-3:05

200M. Undergraduate Directed Research: Martin Luther King, Jr. Papers Project
units by arrangement (Staff)

200W. Undergraduate Directed Reading
units by arrangement (Staff)

200X. Undergraduate Directed Research
units by arrangement (Staff)

202. Undergraduate Colloquium: Introduction to Problems of Historical Interpretation and Explanation—(Same as 302A.)
5 units, Spr (Emmons) Th 4:15-6:05

204. Undergraduate Colloquium: Historians and Computers
5 units, Spr (Lougee) W 1:15-3:05

204C. Peters Seminar: Jews and Muslims—Survey of 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.
5 units, Spr (Rodrique) W 1:15-3:05

204D. Peters Seminar: Approaching Islam—History and Western Representations—Standard texts of Islamic history and a critique of the method of these texts, designated by Edward Said as "Orientalism." Examination of one or more case studies in recent history that juxtaposes local histories of the Middle East, policy interests of the Western powers, and dominant Western portrayals of Islam, Arabs, and the Middle East.
5 units, Win (Beinin) T 1:15-3:05

205A. Undergraduate Colloquium: Private Lives—Public Stories—Autobiographies and other sources. The changing contexts of women's lives and the way women's actions have shaped and responded to those contexts. DR:9†(5)
5 units, Aut (Lougee, Johansson) T 1:15-3:05

206S. Undergraduate Colloquium: The Churches and Kingdoms—Secular and Ecclesiastical Powers in Conflict and Dialogue—Open to advanced majors or by the consent of the instructor. Focus is on the cosmic issue of "Church and State" and how to translate it into "religion and politics." Also, the mundane routine interaction between clergy and lay rulers. The Roman papacy, religious criticism and hallowing of government, the so-called "Gregorian reform" and its effects, the place of ecclesiastical lordship in the world of the secular aristocracy.
5 units (Buc) not given 1994-95

207. Undergraduate Colloquium: Topics in Comparative Women's History—(Same as Feminist Studies 154.) Women and religion, sexuality and reproduction, women's work, politics, colonialism, and feminism in Europe, the U.S., and part of Latin America and Africa. DR:9†(5)
5 units (Brown, Freedman) not given 1994-95

210A. Undergraduate Colloquium: The Language of Politics in the Middle Ages—The different methods through which political theory was articulated and communicated and a culture of politics created: language proper, and its grammar (as elaborated in biblical exegesis and used in other mediums), gestures (and the theory of gestuality), royal proclamations, rituals (peace-making and conflict-resolution, royal funerals, advents, and coronations), and iconography.
5 units (Buc) not given 1994-95

211. Undergraduate Colloquium: Body, Gender, and Society in Medieval Europe—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. DR:9†(5)
5 units (Buc)
212. Undergraduate Colloquium: Homosexuals, Heretics, Witches, and Werewolves: Deviants in Medieval Society — (Same as 312.) Why were medieval heretics accused of deviant sexual practices? Who were the internal enemies of Christendom, real and imagined? What were Europeans afraid of? Examines the transformation of the persecuted Christians into a “persecuting society” by looking at heretical movements of the later Middle Ages, and real and imagined “deviants” (Jews, witches, werewolves, the Templars, and homosexuals).

5 units, Win (Smoller) T 2:15-4:05

214. Undergraduate Colloquium: Magic, Science, and the Occult in Medieval and Renaissance Europe — (Same as 314.) Horoscopes, gem stones, love potions, incantations. Were these magical tools or the reasonable application of medieval scientific thought? The relationship between magic and science in medieval and Renaissance Europe. Why were magic and science linked? How did people distinguish between good, permitted magic and bad, illicit magic? Was the church responsible for a rise of magic in the Middle Ages? How did people eventually distinguish between the scientific and the magical or occult? Selected primary sources are compared with modern interpretations of medieval and Renaissance astrology, alchemy, “natural” magic, witchcraft, invocation of spirits, and magical tales of chivalry and romance.

5 units, Aut (Smoller) T 1:15-3:05

217A. Undergraduate Colloquium: Empire and Nation in Russian and Soviet History — Part I — (Same as 317A.) From Catherine the Great to WWI.

5 units, Win (Von Hagen) W 3:15-5:05

217B. Undergraduate Colloquium: Empire and Nation in Russian and Soviet History — Part II — (Same as 317B.) WW I and II. Recommended: 217A.

5 units, Spr (Von Hagen)

218. Undergraduate Colloquium: Origins and Development of Balkan Nationalism — Introduction to the origins and development of nationalism in Albania, Bulgaria, Romania, Greece, and the Yugoslav lands in the 19th and 20th centuries. Topics: national ideologies and national movements, the establishment of independent nation states, problems of national minorities, irredentism as a force in regional conflict, and nationalism under communist rule. Why nationalism has been a central political issue in the Balkans starting from the 19th century.

5 units, Win (Bracewell)

220. Undergraduate Colloquium: Yugoslavia in Dissolution — History of the relations among the South Slavs. Topics: the genesis of the movement for S. Slav unity, the Yugoslav question in WWI, the founding of the first Yugoslav state in 1918, the Yugoslav crisis in the interwar period (1918-1941), the Axis invasion, partition, and occupation of Yugoslavia in WWI, the emergence of Communist Yugoslavia, postwar intra-Yugoslav conflict and competition, the collapse of Yugoslavia, and the fratricidal strife in Bosnia-Hercegovina and Croatia since 1991.

5 units, Win (Vucinich)

221. Undergraduate Colloquium: History and Myth in the Balkans — Nationalists have called on history to establish the origins of their nation, define its character, and legitimate claims for its destiny. The nationalist uses of history in the Balkan context, analysing the development, significance, and uses of national myths (e.g., the Daco-Roman idea, the Battle of Kosovo). Why the past plays an important role in nationalist ideology. Recommended: some knowledge of the area.

5 units, Spr (Bracewell)

221S. Undergraduate Research Seminar: Wartime and Postwar Poland — The problems of German and Soviet occupation. Polish resistance during the war, and 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 1994-95

222. Undergraduate Colloquium: Comparative Early Modern Nobilities: Russia, Poland, 19th and 20th Century

5 units (Kollmann) not given 1994-95

223. Undergraduate Colloquium: Stalinism in Eastern Europe — The origins and history of Stalinism in Eastern Europe. The ways E. European countries have confronted the Stalinist past. Readings focus on historical and literary representations of Stalinist theory and practice.

5 units (Naimark) not given 1994-95

225. Undergraduate Colloquium: East European Women and War in the 20th Century — Societies of Eastern Europe during war and occupation, WWI to the current crisis in Bosnia. Women’s experience of war, including changes in their lives from war, how they interpret these changes, how women participate, and how they are used physically and metaphorically by belligerents and compatriots. The interplay of gender nationality in the construction and manipulation of identities. Emphasis is on sources, historiography, theoretical approaches, and comparison with Western Europe and the former Soviet Union.

5 units, Win (Jolluck) W 1:15-3:05

225S. Undergraduate Research Seminar: Law and Society in Early Modern Russia

5 units (Kollmann) not given 1994-95
228S. Undergraduate Research Seminar: War and Society in the 20th Century — Research paper on some problem in the relationship between modern wars and their social setting.
5 units (Sheehan) not given 1994-95

229. Undergraduate Colloquium: Churches Under Dictatorship in Germany, 1933-1989 — Germany from 1933-1989, focusing on the relationship of Christians and the Christian churches to the National Socialist regime of 1933-45 and the post-war German Democratic Republic which collapsed in 1989. Opposition and cooperation with and support for these regimes from the side of the church. Religious attitudes and institutions as a significant component in understanding these two periods.
5 units, Aut (Besier, Ericksen) T 3:15-5:05

231S. Undergraduate Research Seminar: French Political Culture, 1700-1850
5 units (Baker) not given 1994-95

232. Undergraduate Colloquium: Paris and the Birth of Modernity in the 19th Century — The relationship between the experience of urbanization and the definition of a cultural phenomenon called modernity in 19th-century Paris. Focus is on literature (Balzac, Hugo, Baudelaire), Impressionism and Post-Impressionist art (Manet, Degas, Cezanne), photography (Nadar, Atget), urban administration and architecture (Haussmann), psychology and medicine (Charcot, LeBon).
5 units, Spr (Aisenberg) Th 1:15-3:05

232S. Undergraduate Research Seminar: Rousseau
5 units (Baker) not given 1994-95

233. Undergraduate Colloquium: Medicine, Mortality, and Health Care in Europe and America, 1600 to Present — Introduces the challenges of studying health, health care, and longevity from a historical perspective by considering the experience of Europe and N. America over the last few centuries. Topics: theories of disease, attempts to control disease at the community level, cures, and the connection between medicine and mortality. The changing organization of the medical profession, the different health needs of men, women, and children and how they have been met since 1600.
5 units, Aut (Ryan-Johansson) Th 1:15-3:05

234. Undergraduate Colloquium: The Literature of Totalitarianism in Politics and Literature in 20th-Century Europe — The term totalitarian and its "ism" have exercised a powerful effect upon the literary and political imagination of the 20th century. Novels, political theory texts, and artworks develop an understanding of the political and psychological dimensions of the term, and the political events gave it shape (communism and fascism). Readings/discussions focus on the role of the individual citizen within these "systems," the political logic of each of these ideologies as movements, and the power that these ideas exerted over the political and literary landscape of the period.
5 units, Win (Seaver) W 3:15-5:05

234A. Undergraduate Colloquium: Technology in 20th-Century America and Europe — (Same as History and Philosophy of Science 122; Science, Technology, and Society 122.) The history of 20th-century western technology. Topics: the rise of the engineering profession, labor and technological change, gender and technology, the emergence of technocratic ideologies, and the rise of large-scale technological systems.
5 units (Hecht) not given 1994-95

235A. Undergraduate Colloquium: Art and Society in 19th-Century Europe
5 units, Aut (Sheehan) Th 1:15-3:05

237. Undergraduate Colloquium: Gender and Cultural Change in 19th-Century France and Britain
5 units, Spr (Cody)

5 units, Aut (Robinson) W 2:15-4:05

239S. Undergraduate Research Seminar: The Nuclear Age
5 units, Spr (Hecht) Th 1:15-3:05

240. Undergraduate Colloquium: Early Modern London — The Politics and Culture of Growth — Between 1500 and 1700 London grew from a late medieval town of 50-60,000 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 the 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, Win (Seaver) T 1:15-3:05

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, Aut (Seaver) W 2:15-4:05

242S. Undergraduate Research Seminar: Texts and British Society, 1750-1950 — 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) W 2:15-4:05

248S. Undergraduate Research Seminar: Science, Society, and the Sexes in 19th-Century Britain and France
5 units, Aut (Cody) Th 1:15-3:05

248. Undergraduate Colloquium: Colonial States and Societies in Africa—(Same as 448A.)
10 units, Win, Spr (R. Roberts) Th 2:15-5

249. Undergraduate Colloquium: Religions, Cultures, and History in West Africa and the African Americas—The shared cultural and historical experience of W. Africans and Africans in the Americas, with religion as a site of cultural production. Focus is on W. and W. Central Africa, African Caribbean and Brazil, and African N. America, emphasizing the historical experience of the slave trade and diaspora. Part of a collaborative Bay Area exploration of linkages between Africa and the African Americas.
1, 3, or 5 units, Aut (R. Roberts) T 3:15-5:05

250A. Undergraduate Colloquium: The Constitution in American Politics—Ideas of rights in American constitutionalism from the 17th century to the present. Topics: the English Declaration of Rights of 1689, the framing of the Revolutionary bills of rights of 1776 and 1789, the 14th Amendment, and the contemporary “rights revolution” and the debate over the virtues and vices of “rights-talk.” The problem of ascertaining “the original meaning” of particular rights, including the 1st, 2nd, 9th, and 14th Amendments.
5 units, Spr (Rakove) Th 1:15-3:05

251A. Undergraduate Colloquium: Poverty and Homelessness—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. Must interview with the instructor before enrolling.
5 units, Win (Staff)

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 (J. Corn) not given 1994-95

5 units, Aut (Kleiman) TTh 3:15-5:05
253S. Undergraduate Research Seminar: Museum Practicum — Supervised curatorial work on exhibition at local museum. Prerequisites: 252S or equivalent, and consent of instructor. 1-3 units (J. Corn) not given 1994-95

254S. Undergraduate Research Seminar: U.S. Women's History — (Same as Feminist Studies 103E.) 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, Spr (Frederman) Th 1:15-3:05

258. Undergraduate Colloquium: Modern America in Historical Perspective — The historical background, present character, and public implication of: the status of women, race and race relations, ethnicity, the condition of the family, poverty, and current political culture. Prerequisites: 165C or equivalent, and consent of instructor.
5 units (Kennedy) not given 1994-95

259. Undergraduate Colloquium: Black and White 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, 164, or equivalent.
5 units, Win (Fredrickson) W 1:15-3:05

260A. Undergraduate Colloquium: Perspectives on American Identity — (Enroll in American Studies 200.)
5 units, Aut (J. Corn) T 3:15-5:30 Spr (Gillam)

261. Undergraduate Colloquium: Nuclear Weapons — Theories and History — (Same as Political Science 246.) Case studies involving nuclear weapons and related international relations theory.
5 units, Spr (Bernstein, Holloway)

263A. Undergraduate Colloquium: The Automobile Industry in 20th-Century America — (Same as Science, Technology, and Society 221.) 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 governmental regulation; and recent challenges to the industry stemming from technological change, foreign competition, and environmentalism.
5 units (J. Corn) not given 1994-95

264S. Undergraduate Research Seminar: The Papers of 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, Aut (Carson) M 1:15-3:05

265. Undergraduate Colloquium: New Research in Asian American History — (Same as 365.)
5 units, Spr (Chang) W 1:15-3:05

265S. Undergraduate Research Seminar: Asian-American History — (Same as 465.) For undergraduate and graduate students with course work or self-study in Asian-American history. Selected topics, research, and independent writing. Readings of secondary and primary material, research exercises, and an extended historiographic or literature review essay.
5 units (Chang) not given 1994-95

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, Aut (Sawislak) T 1:15-3:05

267S. Undergraduate Research Seminar: American Migrations — Research and write an original study of one (or more) of the following: European or Asian immigration to the U.S. in the 19th and early 20th centuries; black migration out of the American South in the 20th century, especially during and after WWII; the "newest immigration" since 1965. Prerequisites: 165B, 165C, senior standing, and consent of instructor.
5 units (Kennedy) not given 1994-95

268. Undergraduate Colloquium: Immigration and Ethnicity in Modern American History — Issues of race, human migration, and ethnicity are provocative areas of historical research today. Readings/discussion on recent literature and interpretations on the last 100 years of American history. Comparative critical perspective explores the complex issues involved in the migration process. The various competing theories explaining the dynamics of immigrant-native interaction (assimilation, pluralism, ethnogenesis, and transnationalism), citizenship, and the persistence (or lack thereof) of ethnic attachments among different groups in American society.
5 units Win (Gutierrez) T 1:15-3:05
268S. Undergraduate Research Seminar: Politics and Political Ideas, 1760-1803 — Topics in the political and constitutional thought of the Revolutionary era, including the problems of recovering the "original meaning" of the Constitution.  
5 units (Rakove) not given 1994-95

270. Undergraduate Colloquium: State Punishment and Cultural Deviancy in America — (Same as 370, Law 626.) The history of the American state machinery of punishment from the 18th century invention of the penitentiary and the cell to California's state of the art Pelican Bay State Prison. Psychology of the American captive, the attraction of crime in American culture, prisoner autobiographies and crime literature, cultural deviancy and the "therapeutic community" model, and prisoner and Bay Area resistance in the 1960s-70s movement against the prisons. The contemporary gang system in California.  
5 units, Win (Cummins) T 3:15-5:30

271. Undergraduate Colloquium: The History of American Indians since 1934  
5 units, Win (Staff) Th 3:15-5:05

5 units, Win (Lenoir)

276. Undergraduate Colloquium: The Creation of North America — Open to graduate students. Responding to rapid changes in the world economy, Canada, the U.S., and Mexico are moving toward a free trade bloc while developing common interests in a shared regional space. This convergence is transforming relations between three sovereign states, each with its distinct political system, its own 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 WWII through the movement of peoples and development of complex identities today.  
5 units, Spr (Wirth) T 3:15-5:05

277A. Undergraduate Colloquium: Ethnicity, Class, and Identity in Latin America — (Same as Latin American Studies 180.) The concept of ethnicity in Spanish American thought and action beginning with the conquest of the Indian population and the introduction of African slavery; the relationship between ethnic classification and the class structure within the context of miscegenation and economic development, and the emerging sense of Spanish American uniqueness in the 19th and 20th centuries, a period of political independence, the abolition of slavery, "scientific" racial theory as an explanation for underdevelopment, and (in some areas) a celebration of ethnic diversity.  
5 units, Win (Bowser) Th 3:15-5:05

277S. Undergraduate Research Seminar: Ethnicity, Class, and Identity in Latin America — (Same as Latin American Studies 280.) Student selected research topics based on the historiographical discussions conducted in 277A. Prerequisite: 277A.  
5 units, Spr (Bowser) Th 3:15-5:05

278. Undergraduate Colloquium: Historical Aspects of Underdevelopment in Latin America — (Same as Latin American Studies 183.) 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. Prerequisite: consent of instructor in prior quarter.  
5 units (Haber) not given 1994-95

280. Undergraduate Colloquium: Modern Mexico — Interdisciplinary analysis of Mexico since the Revolution of 1910. Studies of political economy written by historians, economists, anthropologists, and novelists. Prerequisite: consent of instructor in prior quarter. Recommended: prior study of Latin American history, politics, or economic development.  
5 units (Haber) not given 1994-95

282. Undergraduate Colloquium: The Agrarian Origins of Underdevelopment in Latin America — (Same as Latin American Studies 187.) 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 Bolivia and Mexico during the 18th and 19th centuries. Works written by development economists, social historians, and economic historians. Prerequisite: consent of instructor during prior quarter.  
5 units, Spr (Haber) Th 1:15-3:05

283. Undergraduate Colloquium: Comparative Slave Societies — Brazil, the Caribbean, and the United States — (Same as 383, Latin American Studies 181.) The distinctiveness of slave societies in the context of the history of the New World, and
the similarities and differences evidenced among the three major slave-holding regions over the 400 years slavery persisted as the predominant form of labor organization. A critical evaluation of the historiographical trends which marked slave studies in recent decades and on the debates which they have generated regarding economic performance, the nature of the master/slave relationship, the external and/or internal dynamics of slave systems, slave resistance and accommodation, etc.

5 units, Aut (Libby) M 3:15-5:05

285A. Undergraduate Colloquium: National Identity in Israel — The development of national identity in Israel from 1880 to the present. Focus is on literature and the arts as an instrument for examining national identity and as a means for creating it. Topics: theories of identity in general, the creation of national identity in new states, and Jewish/Israeli identity in particular; debates within particular historical events and changes in national self-identification.

5 units, Aut (Mancall) M 1:15-3:05

286. Undergraduate Colloquium: Economic and Social History of the Modern Middle East — 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, Spr (Beinin) W 1:15-3:05

287A. Undergraduate Colloquium: Modern Jewish Identity

5 units, Aut (Rodrigue) Th 1:15-3:05

287S. Undergraduate Research Seminar: Topics in the Modern History of Egypt and Palestine — (Same as 487.) Student-selected research topics with guided historiographical reading and discussions as an introduction.

5 units (Beinin) not given 1994-95

288. Undergraduate Colloquium: Palestine and the Arab-Israeli Conflict — (Same as 388.) The Palestine-Zionist conflict from 1882 to the present through reading and comparing representative expressions of competing historical interpretations. U.S. policy towards the conflict since 1948.

5 units; Aut (Beinin) W 1:15-3:05

289A. The Ottoman Empire — Rise of the Ottoman Empire from the 14th to 16th centuries. The Balkans and the Middle East under Ottoman rule. Systems of government 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, WWI, and the collapse of the Ottoman Empire.

DR:2(*)
5 units (Rodrigue) not given 1994-95

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. As one of a range of forces in Jewish politics in these years, and later, 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 pre-state Palestine.

5 units (Zipperstein) not given 1994-95

290. Undergraduate Colloquium: United States and Japan — Case studies of cultural, political, and economic interaction between Japan and U.S. during the 20th century. Topics: early Japanese views of the U.S., the rise of Japanese imperialism and its consequences, the outbreak of the Pacific War, the American occupation of Japan, and emergence of postwar trade friction.

5 units (Duus) not given 1994-95


5 units, Win (Van Slyke) T 3:15-5:05

291A. Undergraduate Colloquium: Industrialization of Japan — (Same as 391A.) The emergence of Japan as an industrial economy since the middle of the 19th-century. Topics: proto-industrialization in the Tokugawa period, role of state entrepreneurship, emergence of a capitalist class, transfer of technology, creation of a working class, and social and intellectual consequences of industrialization. Post-1945 developments.

5 units (Duus) not given 1994-95

292. Undergraduate Colloquium: Postwar Japan — 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 1994-95


5 units (Duus) not given 1994-95

292S. Undergraduate Research Seminar: China in the Western Imagination, 16th-20th Century — (Same as Asian Languages 192S.) 500 years of 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 reasearch project which explores subject (the viewer) and object (the viewed) in the early modern history of China.

5 units, Spr (Kahn) W 1:15-3:05

295. Undergraduate Colloquium: A History of Japanese Religion—Pre-modern in focus, examines Japanese religion in terms of doctrinal, political, social, military, and economic history. Primary sources in translation. Structures of belief and practice and the synchronic interaction of such with the contemporaneous ideological environment.

5 units (Ketelaar) not given 1994-95

295A. Undergraduate Colloquium: The Korean War—Watershed in Asia

5 units (Van Slyke) not given 1994-95

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, i.e., 16th-19th centuries. Prerequisite: consent of instructor.

5 units, Aut (Kahn) T 1:15-3:05

297. Undergraduate Colloquium: Women and the Family in Chinese History

5 units, Win (Neskar)

299. Undergraduate Colloquium: The Institutions of Medieval Japan

5 units, Win (Mass) W 1:15-3:05

GRADUATE

300W. Graduate Directed Reading

units by arrangement (Staff)

301. Graduate Colloquium: Historiography of American Education—(Same as Education 301.)

3-4 units, Spr (Tyack)

302A. Graduate Colloquium: Introduction to Problems of Historical Interpretation and Explanation—(Same as 202.)

4-5 units, Spr (Emmons) Th 4:15-6:05

302C. Graduate Colloquium: The Process of Industrialization—Europe, The United States, and Latin America—(Same as Science, Technology, and Society 220.) 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.

4-5 units (Haber) not given 1994-95

304A. Graduate Colloquium: Historiography of Colonial Spanish America

4-5 units, Aut (Bowser) W 2:15-4:05

304B. Graduate Colloquium: Historiography of Colonial Spanish America

4-5 units, Win (Bowser) W 2:15-4:05

304C. Graduate Core Seminar in Latin American Studies—(Same as Latin American Studies 250.) Introduction to Spanish-American civilization.

4-5 units, Aut (Bowser) Th 4:15-6:05

305. Graduate Colloquium: Graduate Workshop in Teaching—Introduction to teaching, lecturing, and curriculum development.

1-2 units (R. Roberts) not given 1994-95

307. Graduate Core Colloquium in Medieval History

4-5 units (Buc) not given 1994-95

309. Graduate Colloquium: The Renaissance

4-5 units, Aut (J. Brown) Th 1:15-3:05

310A. Graduate Colloquium: The Language of Politics in the Middle Ages

4-5 units (Buc) not given 1994-95

311. Graduate Colloquium: Body, Gender, and Society in the Middle Ages

4-5 units (Buc)

312. Graduate Colloquium: Homosexuals, Heretics, Witches, and Werewolves: Deviants in Medieval Society—(Same as 212.)

4-5 units, Win (Smoller) T 2:15-4:05

314. Graduate Colloquium: Magic, Science, and the Occult in Medieval and Renaissance Europe—(Same as 214.)

4-5 units, Aut (Smoller) T 1:15-3:05

317A. Graduate Colloquium: Empire and Nation in Russian and Soviet History—Part I—(Same as 217A.)

4-5 units, Win (Von Hagen) W 3:15-5:05

317B. Graduate Colloquium: Empire and Nation in Russian and Soviet History—Part II—(Same as 217B.) Recommended: 317A.

4-5 units, Spr (Von Hagen)

318. Graduate Colloquium: Origins and Development of Balkan Nationalism—(Same as 218.)

4-5 units, Win (Bracewell)

320A. Graduate Colloquium: Topics in Early Modern Russian History

4-5 units (Kollmann) not given 1994-95

321. Graduate Colloquium: History and Myth in the Balkans—(Same as 221.)

4-5 units, Spr (Bracewell)
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4-5 units, Win (Fredrickson) W 1:15-3:05

Graduate Colloquium: Nuclear Weapons — Theories and History — (Same as 261.)
4-5 units, Spr (Bernstein, Holloway)

Graduate Colloquium: New Research in Asian American History — (Same as 265.)
4-5 units, Spr (Chang) W 1:15-3:05

History of Higher Education in the U.S. — (Same as 166.)
3-5 units, Spr (Lyman)

Graduate Colloquium: State Punishment and Cultural Deviancy in America — (Same as Law 626.)
4-5 units, Win (Cummins) T 3:15-5:30

Graduate Colloquium: The Creation of North America
4-5 units, Spr (Wirth) T 3:15-5:05

Core Colloquium: Regionalism in America
4-5 units (Wirth) not given 1994-95

Graduate Colloquium: Comparative Slave Societies — Brazil, the Caribbean, and the United States — (Same as 283.)
4-5 units, Aut (Libby) M 3:15-5:05

Graduate Core Colloquium in Jewish History
4-5 units (Rodrique, Zipperstein) not given 1994-95

Graduate Colloquium: Economic and Social History of the Modern Middle East
4-5 units, Spr (Beinin) W 1:15-3:05

Graduate Colloquium: Palestine and the Arab-Israeli Conflict — (Same as 288.)
4-5 units, Aut (Beinin) W 1:15-3:05

Graduate Colloquium: United States and Japan
4-5 units (Duus) not given 1994-95

Graduate Colloquium: Aspects of Late Imperial Chinese History
4-5 units, Aut (Kahn) W 1:15-3:05

Graduate Colloquium: Topics in Late Traditional and Modern Chinese History
4-5 units (Van Slyke) not given 1994-95

Graduate Colloquium: Industrialization in Modern Japan — (Same as 291A.)
4-5 units (Duus) not given 1994-95

Graduate Colloquium: Postwar Japan
4-5 units (Duus) not given 1994-95

Graduate Colloquium: Topics in Middle Period Chinese History
4-5 units, Spr (Neskar) W 2:15-4:05

Graduate Colloquium: Early and Medieval Japan
4-5 units, Aut (Mass) W 1:15-3:05

Graduate Colloquium: Late Medieval and Early Modern Japan—Examination of historical and historiographical issues, orthodox and heterodox, germane to the period and its modern interpretations.
4-5 units, Win (Ketelaar) W 1:15-4:05

Graduate Colloquium: Modern Japan
4-5 units (Duus) not given 1994-95

Graduate Colloquium: The Institutions of Medieval Japan
4-5 units, Win (Mass) W 1:15-3:05

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.

Graduate Research
units by arrangement (Staff)

Graduate Colloquium: Fieldwork Methods in African History
4-5 units (Jackson) not given 1994-95

Graduate Seminar: Medieval History
4-5 units (Buc) not given 1994-95

Graduate Seminar: Topics in the Renaissance
4-5 units (Brown) not given 1994-95

Graduate Seminar: Topics in Modern Russian History
4-5 units (Emmons) not given 1994-95

Graduate Seminar: Topics in Russian History
4-5 units, Spr (Emmons) by arrangement

Graduate Seminar: Institutions of Enlightenment — (Same as 330.)
4-5 units (Baker, Bender) M 3:15-5:05 W 12:15-2:05

Graduate Seminar: Institutions of Enlightenment — Prerequisite: 430A.
4-5 units, Spr (Baker)

Graduate Seminar: Modern Eastern Europe
4-5 units (Naimark) not given 1994-95

Graduate Seminar: European History
8-10 units (Sheehan) not given 1994-95

Graduate Seminar: Topics in the History of Technology
4-5 units, Win (Hecht) Th 2:15-4:05
435. Graduate Seminar: Research Seminar in European History
   4-5 units (M. L. Roberts) not given 1994-95
437. Graduate Seminar: Modern European Cultural and Intellectual History
   8-10 units (Robinson) not given 1994-95
442. Graduate Seminar: Early Modern England
   4-5 units (Seaver) not given 1994-95
445. Graduate Seminar: Research - Modern Britain
   4-5 units, Win (Stansky) T 1:15-3:05
447. Graduate Seminar: East Africa in Transition: 1880s-1920s
   4-5 units (Jackson) not given 1994-95
447A. Graduate Seminar: Fieldwork in Africa — Oral History, Life, and Family History — (Same as 247S.)
   5 units (Jackson) not given 1994-95
448A. Graduate Seminar: Colonial States and Societies in Africa — (Same as 248S.)
   8-10 units, Win, Spr (R. Roberts) Th 2:15-5:05
451. Graduate Seminar: 20th-Century America
   8-10 units, Win, Spr (Bernstein) M 2:30-5:05
452. Graduate Seminar: United States Social History
   4-5 units (Sawislak) not given 1994-95
454. Graduate Seminar: Culture and Ideology in 19th-Century America
   4-5 units, Spr (Fredrickson) Th 1:15-3:05
456A. Graduate Seminar: United States in the 20th Century
   4-5 units (Kennedy) not given 1994-95
456B. Graduate Seminar: United States in the 20th Century
   4-5 units (Kennedy) not given 1994-95
465. Graduate Seminar: Asian-American History — (Same as 265S.)
   4-5 units (Chang) not given 1994-95
468. Graduate Seminar: American Politics and Political Ideas, 1760-1870
   4-5 units (Rakove) not given 1994-95
473. Graduate Seminar: Women’s Family and Sexual History
   5 units (Freedman) not given 1994-95
476. Graduate Seminar on Brazil
   4-5 units, Win (Wirth) T 3:15-5:05
478. Graduate Seminar: Economic and Social History of Latin America — Open to non-Latin Americanists who are workings on research projects that utilize quantitative data. Acquaints students with social science approaches to Latin American history.
   4-5 units (Haber) not given 1994-95
485. Graduate Research Seminar in Modern Jewish History
   8-10 units, Win, Spr (Rodrigue, Zipperstein) Th 2:15-4:05
487. Graduate Seminar: Topics in the Modern History of Egypt and Palestine — (Same as 287S.)
   4-5 units (Beinin) not given 1994-95
490A,B. Graduate Seminar: Modern Chinese History
   8-10 units, Win, Spr (Van Slyke) [M 1:15-3:05]
493A,B. Graduate Seminar: Late Traditional Chinese History
   4-5 units (Kahn) not given 1994-95
498. Graduate Seminar: Japanese Historical Texts — (Same as Asian Languages 251.)
   4-5 units, Win (Mass) by arrangement
498A. Graduate Seminar: Japanese History Sources
   4-5 units (Mass) not given 1994-95

AFFILIATED DEPARTMENT OFFERINGS

AMERICAN STUDIES

163A. The Transformation of American Thought and Culture, 1865 to the Present — DR:†
   5 units, Win (Gillam)

CLASSICS

See Classics, Ancient History section, for descriptions of the following, all of which are accepted for credit toward a major in History.

101. History of Ancient Greece: Society and Politics from Homer to Alexander
   4-5 units, Aut (Johnstone)
102. Roman History I: The Republic
   4-5 units, Win (Staff)
103. Roman History II: The Empire
   4-5 units, Spr (Treggiari) MWF
104. Early Christianity
105. History and Culture of Egypt
106A. Athenian Social History
   4-5 units, not given 1994-95
328. Love and Honor: Attitudes, Morality, and Behavior in the Time of Cicero

ENGLISH

165A. Introduction to Medieval Culture

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
228V. Nationalism and Political Culture in Germany
  4-5 units, Aut (Tempel)

FLORENCE
106V. Italy: From an Agrarian to a Post-Industrial Society
  4 units, Aut (Mammarella)
107V. States and Society in Renaissance Italy
  4 units, Win (Isaacs)
233V. The Implications of the Fall of Communism for Italian Domestic Internal Politics
  4-5 units, Win (Benvenuti)

OXFORD
140V. English Social History 1800-1980
  5 units, Win (Tyack)
141V. European Imperialism and the Third World 1870-1970
  5 units, Spr (Darwin)
146V. Modern African History through the African Novel, 1900-1970 — DR:9(5)
  5 units, Win (Benvenuti)
243V. Urban History in Britain, 1500 to the 20th Century — DR:9(5)
  4 units, Win (Benvenuti)
244V. Art and Society in Britain 1870-1939
  5 units, Spr (Tyack)

PARIS
137V. An Outline of the History of France
  3 units, Aut, Win (Chebel-D’Appollonia)
230V. Social History of Modern France — DR:9(5)
  5 units, Win (Green)

THE PROGRAM IN HISTORY AND PHILOSOPHY OF SCIENCE

Co-chairs: John Dupré, Timothy Lenoir
Professors: Barton Bernstein, Wilbur Knorr
Associate Professor: Joan Fujimura
Assistant Professors: Peter Godfrey-Smith, Yair Guttmann, Gabrielle Hecht
Lecturer: Laura Smoller
Consulting Professor: Max Dresden
Visiting Professor: Naomi Oreskes
Committee-in-Charge: Barton Bernstein (History), Joe Corn (History), Paul David (Economics), John Dupré (Philosophy), Joan Fujimura (Anthropology), Peter Godfrey-Smith (Philosophy), Yair Guttmann (Philosophy), Gabrielle Hecht (History), Wilbur Knorr (Classics, Philosophy), Timothy Lenoir (History)
Affiliated Faculty: Renee Courney (Lecturer), Hans Ulrich Gumbrecht (Comparative Literature), Horace Judson (Senior Research Associate), Henry Lowood (Curator, Stanford Libraries), Robin Rider (Lecturer)
Fellow: Ruth Linden
Visiting Research Scholar: Susan Kelly

The Program in History and Philosophy of Science is an interdisciplinary, non-degree program which focuses on the historical and contemporary aspects of science. At its colloquia, speakers from history, philosophy, anthropology and sociology of science, and technology as well as the sciences and medicine address current problems in the field. The program collaborates with the University’s 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 20th century. These courses can accommodate students with varying backgrounds in the humanities, social sciences, and natural sciences.

At the undergraduate level, students who wish to pursue these studies 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. Students interested in a concentration in anthropology of science should consult Professor Fujimura. 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 with majors in history, philosophy, or anthropology should consult those departments.

COURSES

60. Introduction to the History and Philosophy of Science — (Same as Philosophy 60.) Positivism, Popper, and the old “received view” of scientific theories; problems involving explanation and induction; Kuhn and subsequent attempts to rebuild moderate empiricist positions; case study in the dispute between early geneticists and
Darwinians, and the inauguration of modern evolutionary theory. DR:8(5)
5 units, Aut (Guttman) MWF 1:15

111. The Black Death and Medieval Responses to Plague: The AIDS of the 14th Century — (Same as Human Biology 158, History 111.) What is the legacy of epidemic disaster? The plague that killed one-third of Europe’s population in 1348-49 and continued to haunt Europe through the 17th century. The modern experience of AIDS. How the experience of plague transformed the economy, society, thought, and practice of medicine. The impact of plague on modern thought in inspiring a history in which the major players are microbes and rats; and as metaphor (in Camus’s The Plague and Bergman’s The Seventh Seal).
5 units, Spr (Smoller) MTWTh 10

114/214. Undergraduate Colloquium: Magic, Science, and the Occult in Medieval and Renaissance Europe — (Graduate students register for 214; same as History 214/314.) Horoscopes, gem stones, love potions, incantations. Were these magical tools or the reasonable application of medieval scientific thought? The close relationship between magic and science in medieval and Renaissance Europe. Why were magic and science intimately linked? How did people distinguish between good, permitted magic and bad, illicit magic? Was the church responsible for a rise of magic in the Middle Ages? How did people eventually distinguish between the scientific and the magical or occult? Selected primary sources are compared with modern interpretations of medieval and Renaissance astrology, alchemy, “natural” magic, witchcraft, invocation of spirits, and magical tales of chivalry and romance.
5 units, Aut (Smoller) T-Th 1:15-3:05

120/220. HIV/AIDS: Cultural and Political Contexts of an Epidemic in the United States — (Graduate students register for 220.) Seminar. Meanings of the HIV/AIDS epidemic are local, multiple, and changing. The construction and representation of HIV/AIDS in medical and scientific discourse, popular culture, and the media; the political economy of the pandemic; and the lived experience of HIV/AIDS. How the HIV/AIDS pandemic has refugured ideas about disease and death; how the upward spiraling incidence of HIV infection has shaped health (policy formation, health-services delivery, and the conduct of clinical trials); and how AIDS has transformed meanings of sexualities and sexual differences. Student required fieldwork in an AIDS service organization, community project, or public health agency, or in an AIDS activist organization.
4-5 units, Win (Linden) T 1:15-3:05

121. Technology and Culture in 19th-Century America — (Same as History 115; Science, Technology, and Society 121.) Social and cultural aspects of technological change from the American Revolution through WWI. 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). DR:9(5)
4-5 units, Win (Corn) TTh 2:15-4:05 discussion section for 5 units

122. Technology and Culture in 20th-Century America and Europe — (Same as History 234A; Science, Technology, and Society 122.) Colloquium on the history of 20th-century western technology. Topics: the rise of the engineering profession, labor and technological change, gender and technology, the emergence of technocratic ideologies, and the rise of large-scale technological systems.
5 units (Hecht) not given 1994-95

123. Women and Technology — (Same as Feminist Studies 147B; Science, Technology, and Society 145.) Seminar on current and historical intersections between technologies and women’s lives. Themes: the role of technologies, especially reproductive and visual, in constructing the roles of women; women as developers and users of technology; gendered descriptions of technology, technological professions and the process of technology development; women at work and women’s work in different historical periods. Discussion based on novels, reports, and historical literature, commercials, films.
5 units, Win (Courey) W 2:15-4:05

124. Central Topics in the Philosophy of Science — (Enroll in Philosophy 164.)
4 units, Aut (Dupré) TTh 1:15-2:30

125. Philosophy of Physics — (Enroll in Philosophy 165.)
4 units, Spr (Guttmann) T 2:15-5:05

127. Philosophy of Biology — (Enroll in Philosophy 167.)
4 units, Win (Godfrey-Smith) Th 11-12:15

128. Undergraduate Colloquium: Gender and Cultural Change in 19th-Century France and Britain — (Enroll in History 237.)
5 units, Win (Cody) T 3:15-5:05

129/229. Discovery and Invention in the Renaissance—Innovation during the Renaissance, with examples and contexts from exploration, cultural encounters, science, art, warfare, and exhibits of primary sources, and videos.
4-5 units, Spr (Rider)

Technical aspects of the classical theories (Ptolemaic and Copernican), including mathematics, astronomy, physics, and chemical theory, and more speculative aspects in natural philosophy and theology.

138A. Ancient Period — DR: 8(3)
4 units, Aut (Knorr) MWF 2:15

138B. Cosmology: Middle Ages and Renaissance — DR: 8(3)
4 units, Win (Knorr) MWF 2:15

138C. Modern Period: Newton to Einstein — DR: 8(3)
4 units, Spr (Knorr) MWF 2:15

140. Topics in the History of Mathematics: From Antiquity to the 17th Century — (Same as History 138D, Philosophy 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, Win (Knorr) TTh 2:15-3:30

141. The Industrial Revolution: Historical and Cultural Perspectives — (Same as History 134A; Science, Technology, and Society 131.) 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 by examining industrialization in Third World nations. DR: 9(5)
5 units, Aut (Hecht) TTh 11-12:30

142. The Nuclear Age — (Same as History 135A.) The historical implications of nuclear technology for post WWII society, focusing on relationships between nuclear technological development and political, economic, and cultural change. Topics: development of nuclear programs and how nuclear reactors and weapons work; regulation, risk and safety, policy, and public perception and protest. Covers nuclear programs in America and Europe, and material on the Middle East and S. America.
5 units (Hecht) not given 1994-95

145/245. Scientific Revolution — (Graduate students register for 245; same as History 139, Philosophy 145/245.) 17th-century philosophy and science; the development of science from Descartes to Newton. Emphasis is on basic physical concepts (space, matter, force, inertia, etc.), celestial mechanics, scientific method, and the interplay between science and religion.
4 units (Staff) not given 1994-95

148. From Gutenberg to Volkswagen: Technology and Culture in Germany — (Same as German Studies 175/175A.) Surveys the interaction of material life, technology, and culture in Germany, beginning with the emergence of print culture, emphasizing developments since 1850. Topics: the Industrial Revolution, mechanization, urban development, new means of transportation and communication, "Americanization," technological heroes and crazes, the symbology of progress, and antitechnological movements.
4 units, Spr (Lowood) MWF 10

151/251. Science and High Technology in Silicon Valley, 1930-1980 — (Graduate students register for 251; same as Science, Technology, and Society 222.) Research seminar. 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 counter-culture; and the techno-scientific policies of the Cold War state. Comparison with Route 128. Reviews research literature and explore archival and other resources at Stanford and at local companies. Research papers using these source materials.
5 units, Spr (Lenoir)

152. The Darwinian Revolution — (Same as History 133; Human Biology 152; Philosophy 152; Science, Technology, and Society 130.) Conceptual developments leading to establishment of the major unifying paradigm of biological science, the theory of evolution by natural selection. Biological thought before Darwin (1750 to 1836). Formation of Darwin's thought in terms of its broader intellectual and social context. The Origin of Species. Difficulties the theory had to overcome and their resolution in the union of evolutionary biology and population genetics. DR: 9(4)
4 units (Staff) not given 1994-95

154. The Rise of Scientific Medicine — (Same as History 133A, Human Biology 151.) Intellectual, social, and institutional dimensions of the rise of scientific medicine in the 19th century. How did medicine become "scientific?" What differences did it make to the physician? Why did it display other approaches to medicine? Focus is on France, Germany, and England from 1750 to 1912, and U.S. from 1890 to 1912. Development of experimental physiology and biomedical technology and their contributions to the medical revolution. Concrete relationships of scientific developments in physiology, pharmacology, and bacteriology and effects on medical practice and therapy. Patterns of professionalization of medicine in different nations. Were forces driving professionalization of medicine in these contexts the same or different? How
did institutional structure of the medical profession differ according to its local context?

4 units (Lenoir) not given 1994-95

155/255. The Sociology of Scientific Knowledge — (Graduate students register for 255; same as Anthropology 158, 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 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, Fujimura) not given 1994-95

156. Origins of Life — (Same as History 133D.) Undergraduate seminar. Assumptions underlying research and debate on the origins of life from 1850 to the present. The role of representations in authorizing frameworks for interpreting the origins of life. Two lines of research, one originating with A. I. Oparin’s The Origins of Life (1924) emphasizing a biochemical-metabolic approach to life, the second emphasizing a genetic-informational approach beginning with H. J. Muller’s The Gene as the Basis of Life (1926). Tracing these two to the present, compares reductionist strategies with recent attempts to articulate a concept of “autopoesis”—the notion that living systems are self-assembling, self-enclosing networks of production.

4 units (Thurtle)

160. Gender and Science — (Same as Anthropology 160, Feminist Studies 147A, Human Biology 170.) 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. DR:8(3) or 9(5)

5 units, Aut (Fujimura) TTh 2:15-4:05

161. Undergraduate Colloquium: Nuclear Weapons - Theories and History — (Enroll in History 261/361.)

3 units, Spr (Bernstein, Halloway)

162. Topics in Socio-Cultural Studies of Biotechnology — (Same as Anthropology 162A, Human Biology 164.) Current literature in socio-cultural 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.

5 units, Win (Fujimura)

168. History of Physics — (Same as History 139A.) Describes, analyzes, and interprets the major scientific changes which have characterized the 20th century. The introduction of the ideas of relativity, the surprising and pervasive role of quantum notions, rapidly alternating scientific fashions from nuclear physics to particle physics, from superconductivity to chaos. Emphasis on corresponding changes in sociology, demography, and the impact on philosophy and the changed role of physics in the 20th century.

5 units, Win (Staff) MTWTh 10

170. Physics After World War II — Seminar on the history and philosophy of postwar physics. Effects on scientific development during WWII. The creation of high-energy physics, experiments, symmetries, renormalization, and the creation of gauge physics. Condensed matter physics and level structures of science. Philosophical questions on the changing understanding of “particle theory,” “unification,” and “experimental demonstration.” Source readings: Bethe, Feynman, Gell-Mann, von Neumann, Weinberg; and historical, sociological, and philosophical work in recent science studies. Enrollment by consent of the instructor.

4 units (Staff)

199. Directed Reading

1-5 units (Staff)

232. Science, Technology, and Society — (Same as Anthropology 232; Science, Technology, and Society 232.) Graduate seminar examines science as social activity, exploring 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, Aut (Fujimura) W 2:15-5:05

238. 20th-Century United States — (Enroll in History 451.)

10 units, Win, Spr (Bernstein)

243. Technology, Work, and Culture since the Industrial Revolution — (Same as History 336A; Science, Technology, and Society 243.) Graduate colloquium. Changes in the nature and organization of work in the 19th and 20th centuries in Europe and America. Readings on the relationships between
technology, work, and social and cultural change, emphasizing questions of risk, skill, and gender.

4-5 units (Hecht) not given 1994-95

244. Graduate Seminar: Topics in the History of Technology — (Same as History 434A.)
4-5 units, Win (Hecht) 2:15-4:05

246. Graduate Colloquium: Technology and Society — (Same as History 334A.)
4-5 units, Aut (Hecht) Th 2:15-4:05

255. The Sociology of Scientific Knowledge — (For graduate students; same as 155.)
4 units (Lenoir) not given 1994-95

261. Graduate Colloquium: Nuclear Weapons — Theories and History — (Enroll in History 361.)
5 units, Spr (Bernstein, Halloway)

273. Topics in Philosophy of Economics — (Enroll in Philosophy 273.)
4 units, Spr (Dupré, Satz)

299. Graduate Individual Work
1-5 units (Staff)

PROGRAM IN HUMAN BIOLOGY

Emeriti: (Professor) Albert H. Hastorf (Psychology)
Chair: William H. Durham
Professors: J. Myron Atkin (Education), Clifford Barnett (Anthropology), William Dement (Psychiatry/Behavioral Science), Carl Djerassi (Chemistry), Sanford Dornbusch (Sociology), William H. Durham (Anthropology), Marcus Feldman (Biological Sciences), Russell 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), Seymour Levine (Psychiatry/Behavioral Science), Iris Litt (Pediatrics), Michael Marmor (Ophthalmology), Frank Stockdale (Medicine/Oncology), Arthur B. Wolf (Anthropology)
Associate Professors: Christos Constantinou (Urology), Anne Fernald (Psychology), James Fox (Anthropology), Joan Fujimura (Anthropology), Thomas Raffin (Medicine), John Rick (Anthropology), Robert Sapolsky (Biological Sciences)
Assistant Professors: Amato J. Giaccia (Radiation Oncology), Abby King (Medicine and Health Research Policy), Dona Wong (Psychiatry/Behavioral Sciences)
Other Teaching Faculty: Carol Boggs, Gail Butterfield, Ruth Cronkite, Ben Crow, Anne Ehrlich, S. Shirley Feldman, Dolores Gallagher-Thompson, Hill Gates, William B. Hurlbut, Dominique Irvine, Frances Kamm, Alan Launer, Sherri Matteo, Joanna Mountain, Ellen Porzig, Mark Rosekind, Annye Rothenberg, Merritt Ruhlen, Suzana Sawyer, Robert Scott, Marjorie Shuer, Robert Siegel, Laura Smoller, Kathleen Sullivan, Alvaro Umaña, Christopher Wilson, Gwendolynne Yeo

Student Advisers: Dave Blossom, Melissa Freeberg, Kate Grossman, Nik Kolodny, Jack Rose, Amy Vinther, Sue Yoo

The Program in Human Biology is an inter-school, interdepartmental, undergraduate major. Its purpose is to provide an interdisciplinary perspective of 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 curriculum draws 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.

Although there is no graduate program in Human Biology at Stanford, students are well prepared for advanced training in biology, the behavioral and social sciences, medicine, law, education, or public policy, depending on their choice of upper-division courses. Undergraduates in Human Biology can enter coterminal master 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
   Policy Course 3-5
Statistics 4-5
Internship (HB197) 4

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, Psychology 60, 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. A maximum of 10 pre-med units 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 in, 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.

4. Upper-Division Courses: students must take three Human Biology upper-division courses numbered 100 or above. Students are expected to enroll in courses not directly related to the area of concentration. 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.

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.

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.

The honors program provides majors an opportunity to conduct individual research and write a thesis for up to 15 units of credit (see 198 under "Courses").

Application to the honors program must be made by the third quarter of the junior year after completion of the Human Biology core requirements and the internship. The honors thesis must be submitted by the middle of Spring Quarter of graduation year.

COURSES
INTRODUCTORY

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 MTWTh from 9-10:50 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 have the consent of the program chair. Freshmen are not permitted to enroll. Majors must take core courses for a grade.

2A,B. Genetics, Evolution, and Ecology: Culture, Evolution, and Society — 2A: introduction to 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 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 — DR:5(7)

5 units, Aut (Durham)

2B. Culture, Evolution, and Society — DR:9(4 or 5)

5 units, Aut (Klein)

2S. Seminar in Bioethics — 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 (Hurlbut)
ADDITIONAL OFFERINGS

6. Human Origins — (Same as Anthropology 6.)
The human fossil record from the appearance of 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 years ago. Emphasis is on broad evolutionary trends and on the natural selective forces behind them.

DR:5(7)
5 units, Win (Klein)


3 units, Win (Katchadourian)

11. Sleep and Dreams — (Same as Psychology 140.) Multi-media 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, and other areas.

3 units, Win (Dement, Rosekind) TTh 11-12:15

30. Woman’s Health Research — (Same as Feminist Studies 145A.) Interdisciplinary view of research which involves biological and/or behavioral aspects affecting the health of women.

1 unit, Aut, Win, Spr (Litt) M 4:15

60. Colloquium on Population Studies — (Same as Biology 146.) Series of talks by distinguished speakers introducing a variety of approaches to population and resource studies.

1 unit, Win (M. Feldman) W 4:15-5:30

PETERS SEMINARS FOR SOPHOMORES

Enrollment limited. Applications required and available at 123 Sweet Hall.

96B. Contemporary Issues in Human Experimentation — 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 subjects in terms of
confidentiality, recruitment, and conflict of interest. Legislation addressing inadequate numbers of women and minorities in research projects. Focus is on research with the cognitively impaired, prisoners, and barriers to obtaining informed consent in issues of age, language, and factors that may affect the ability to give truly informed consent.

3 units, Win (Constantinou)

96E. Studies of Animal Behavior — (Same as Psychology 181C.) Animal behavior offers insights about evolutionary adaptations. Seminar on the origins of the study of animal behavior and the development of this field to the present through original research papers. The use and misuse of parallels between animal and human behavior. Possible field trip to observe animals in their natural habitat.

3 units, Win (R. Fernald) W 3:15-5:30

96F. The Human Hand: Evolution, Development, and Molecular Genetics — The function and structure of the human hand from evolutionary and developmental perspectives. Cultural perspectives on the importance of the hand in art, music, instrumentation, mathematics (base ten) communication (including American Sign Language). Topics: structure of the hand in human and non-human primates, evolutionary and developmental approaches to pattern formation in the hand.

4 units, Win (Porzig)

96G. Multidisciplinary Perspectives on Guilt — Concepts and experiences of guilt from multi-disciplinary perspectives. Evolutionary perspective of the possible antecedents of guilt and its manifestations throughout the human life cycle. How various societies have used guilt as a form of social control, and conceptions of guilt in philosophical thought and religious traditions.

3 units, Spr (Katchadourian)

96H. Harassment and Discrimination — Sexual harassment and gender discrimination from a psychological, economic, historical, and political perspective. Impact on self esteem, validation, career opportunities, aspirations, and earning capacity. Topics: legislation dictating equality, exploration of delayed implementation of legislation, change of social expectations and beliefs during a 20-year period.

3 units, Aut (Shuer)

96I. Biology and Culture in Language Development — (Same as Psychology 181E.) Do humans have an "instinct" for language, or is language a complex cultural artifact that we acquire by means of general learning mechanisms? Debates by researchers in language development, neurobiology, psycholinguistics, and anthropology. Topics: language acquisition in children, linguistic abilities in apes, biology of language disorders, evolution of speech and language, and the role of culture in language development.

3 units, Spr (A. Fernald) Th 3-5

97A. Approaches to Understanding the Life Course — Ways social scientists have attempted to understand an individual's life. Lewis Terman's study of gifted children, now in their 80s, who were followed throughout their lives. The notion that there are epochs of a person's life.

1-2 units, Aut (Hastorf)

ADVANCED

Open to non-majors with the proper prerequisites. Human Biology majors have preference when enrollment is restricted.

103. Women, Fertility, and Work: The Biology/Culture Debate About Gender — Seminar on women'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 Kalahari San, Highlands New Guinean, matrilineal Melanesian, traditional Chinese, and working-class American communities. Theoretical approaches to the connection between biology and culture are tested, emphasizing interactional effects. The limits of theories of the cultural construction of femaleness, connections between gender and political economy, and how these cultures differently envision individual and collective responsibilities in women's work and childcare.

5 units, Win (Gates)

105. Ethnogerontology — Key sociocultural aspects of 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. Prerequisites: Human Biology core consent of instructor.

4 units (Gallagher-Thompson, Yeo) not given 1994-95

107. Biology and Space Exploration — Evolution cast against space and time, and focusing on the emergence of life, intelligence, and civilization on Earth and elsewhere. Life that derives from 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. Prerequisites: introductory courses in biology, human biology, chemistry, physics, psychology, or sociology.

3 units, Spr (Staff)
108. Sociology of Mental Health — (Same as Sociology 157/257.) Interdisciplinary introduction to the concept of mental disorder and its social/historical context, certain types of mental disorders and their epidemiology, factors that shape psychiatric diagnosis, various models of the causes and treatment of mental disorders, current trends and issues in the organization and delivery of mental health services, current trends in evaluation treatment programs, and ethical issues in mental health practices. Opportunities for community service internships for additional credit.

5 units, Spr (Cronkite) TTh 11-12:30

109. Human Behavioral Biology — (Same as Biology 150/250.) 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.

5 units (Sapolsky) given 1995-96

110. Vertebrate Biology — (Same as Biology 110.) 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 units, Spr (Porzig)

110L. Vertebrate Biology Lab — (Same as Biology 110L.) 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 Human Biology 110.

3 units, Spr (Porzig)

111. Human Physiology — (Same as Biology 112.) The functioning of organ systems, emphasizing mechanisms of control and regulation. Topics: structure and function of the endocrine and central nervous systems, cardiovascular physiology, respiration, salt and water balance, exercise and gastrointestinal physiology. Lectures/discussion. Prerequisites: Biology or Human Biology core.

4 units (Heller, Harris) not given 1994-95

113. Biology and Evolution of Language — (Same as Anthropology 5.) 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 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 1994-95

114. Evolutionary Anthropology — (Same as Anthropology 181.) 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.

5 units (Durham) not given 1994-95

115A. Humans and Viruses — Overview of human virology and selected topics to illustrate important concepts in biology and the social sciences. Focuses on viral classification, vaccination, eradication of disease, retroviruses, herpes viruses, cancer viruses, emerging viruses, and viral evolution. Broad perspective: e.g., molecular biology of genetic shift and drift in influenza virus, cellular tropism of HIV (AIDS virus), development biology of virally induced birth defects, clinical aspects of infantile diarrhea, social aspects of the common cold, policy issues of blood antibody tests, cultural factors in transmission of kuru. Prerequisites: Human Biology core or consent of instructor.

5 units, Win (Siegel)

115B. Seminar: The Vaccine Revolution — Advanced seminar: human aspects of viral disease, focusing on recent developments in the area of vaccines. Journal club format: students select articles from primary scientific literature, write formal summaries, and synthesize into a literature review on a specific topic. Emphasis on development of critical reading, analysis, experimental design, and interpretation of data. Students give four oral presentations based on their reading. Discussion on student questions and critique. Prerequisite: 115A or equivalent.

4 units, Spr (Siegel)

116. Eye and Implications of Vision — The basic physiology of vision and how visual capabilities influence human endeavors. Comparisons to the specialized eyes of animals. Topics: illusions, visual physiology of art, the eye in history and literature, and vision in sports. After initial didactic lectures, seminar format with student participation, oral presentations, and a written thesis. Prerequisites: interest in the science 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 retraining 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 recent past. Emphasis on issues for local, state, and federal authorities, particularly appropriate governmental roles in selection of content, improvement of teaching, and research. Attention to primary, secondary, and the undergraduate programs; and use of museums and media in programs to improve science education. International comparisons where appropriate.

4 units (Atkin) not given 1994-95

118. Human Diversity: A Linguistic Perspective — Human diversity from a linguistic perspective. How such diversity can shed light on 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, Spr (Ruhlen)

119. Conservation Biology — (Same as Biology 144.) 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) MWF 10

120. Human Nutrition — Introduction to human nutrition including the function, digestion, absorption, and metabolism of nutrients; dietary recommendations and standards; personal dietary assessment. Prerequisite: Human Biology core or consent of instructor.

4 units, Aut (Butterfield)

121. Ethical Issues in the Neurosciences — Multidisciplinary 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 units, Spr (Hurlbut) MW 7:30-9:30 p.m.

123. Development in Infancy — (Same as Psychology 130.) Development in the first two years of life. Topics: prenatal development and childbirth, perceptual development, cognitive development in infancy, parent-infant interaction, infant social cognition, the development of emotion, and preverbal communication. Prerequisite: Psychology 1 or Human Biology core.

3-4 units, Spr (A. Fernald) TTh 1:15-2:30

124. Neural Basis of Sleep and Circadian Rhythms — (Same as Biology 149.) Review of current research. The phenomenon of sleep from neurophysiological, neurochemical, and neuroendocrinological aspects. The pathology of sleep, thermoregulation and sleep, hibernation, and the interactions between sleep pattern and circadian rhythms. Enrollment limited to 20. Prerequisite: 4A, Biology 32, or equivalent.

3 units, Aut (Heller)

126. Advanced Vertebrate Development — Current themes in vertebrate developmental biology and techniques of reading and criticizing scientific literature. One three-hour evening section per week with lectures, discussion, and student presentations. Critically assesses experimental literature in basic biology.

3 units, Spr (Stockdale)

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. Perspectives from medical history, anthropology, theology, and philosophy show 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)

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. DR:2(*) or DR:9(5*)

3-5 units (Staff)

Alternate years, given 1995-96
136. Population Perspectives in the Third World — (Same as Economics 133, Food Research 136/236, Sociology 153.) Topics: population growth in the Third World; demographic terminology and methods; trends and determinants of fertility, mortality, and migration; population growth in relation to the environment, urbanization, and development; theories of demographic change; population policies; prospects for the future.
3 units, Spr (Wilson) MW 9-10:50

137. Poverty, Technology, and Rural Industrialization — (Same as Science, Technology, and Society 270.) Can technical change reduce rural poverty in developing countries? Ways of understanding rural poverty, technical change, and the relationship between them. Debates about large- and small-scale technologies, industrialized and peasant agriculture, alternative and appropriate technology, connections between industry and agriculture, indigenous and western knowledge, gender and the control of technology, and forms of labor mobilization. Case studies from Asia, Southeast Asia, Africa, and Latin America. Collective research project explores a debate about technical change within a social context. Seminar, limited enrollment.
5 units, Spr (Crow)

139. Conservation and Community Development in Latin America — (Same as Anthropology 161A, Latin American Studies 196.) The problems and potentials for linking management of protected areas (parks, reserves, wildlife sanctuaries, etc.) with local community development in Latin America. Case studies include national and private parks in Costa Rica, and biosphere reserves in Central and S. America. Emphasis on the impact of Western conservation efforts on indigenous peoples and the ways such efforts might be carried out with social, cultural, and economic benefits at the local level.
3-5 units, Win (Durham, Irvine, Umaña)

3 units, Win (Shuer)

142. The Impact of AIDS — Focuses on AIDS as a viral infection, particularly in terms of disease pathology and spread of the virus, providing a solid foundation for understanding the impact of AIDS on biology, medicine, and society. Provides tools for thinking of ways to stop the transmission of HIV, emphasizing education. Cultural aspects of HIV, including perspectives from sociology, law, economics, ethics, and politics. Students use their knowledge to complete a public service project such as teaching high school students about AIDS as part of a student speaker bureau.
4 units (Siegel) not given 1994-95

143. Early Experience — (Same as Psychology 190.) Experimental literature related to effects of pre- and postnatal environmental factors on development and adult function. Animal and human research, and behavioral and psychological function. Prerequisites: Human Biology core or consent of instructor.
3 units, Win (Levine) TTh 4:15-5:30 alternate years, not given 1995-96

144. Ethical Values in Health Care: Lessons from the Nazi Period — (Same as Medicine 246.) Current health care issues from a historic perspective. Lessons from the actions of the German medical profession during the Nazi period. Clinical experimentation, the physician-patient relationship, rationing of health care, active and passive euthanasia and gene therapy in the context of social, economic, and political currents shaping the values and behavior of health care providers in Nazi Germany and the U.S.
3 units (Raffin) not given 1994-95

145. Third World Development — Interdisciplinary introduction to the issues of Third World development, differences in approach, and contributions of different academic disciplines. The diversity of the developing world, the growing gap between rich and poor, industrialization, agrarian change, the role of the state in development, the relationship between environment and development, and questions relating to gender and development.
5 units, Aut (Crow) MW 9-10:30

148. Environmental Policy — Enrollment limited to 12 Human Biology seniors. 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. Main points: definition and description of environment and environmental 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. Prerequisites: Human Biology core, 40, or consent of instructor.
3 units (A. Ehrlich) not given 1994-95

149. Indigenous Peoples and Environmental Problems — (Same as Anthropology 169, Latin American Studies 129.) 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
150. Seminar: Gender-Specific Perspectives on Birth Control — (Same as Feminist Studies 145.) Limited to 20 seniors; junior standing considered in exceptional circumstances. In most societies human fertility control responsibility rests predominantly with women. Is this desirable and realistic, or should changes be instituted? Introducing a new, practical birth control agent or procedure involves legal, political, cultural, economic, and biological factors, and illustrates how such components enter into major policy decisions. Emphasis is on evaluation of logistic aspects of human fertility control and “hardware” and “software” aspects of birth control. 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 multidisciplinary task forces, and individual discussions with each task force. Part II: library and field work, writing task force reports, and oral presentations. DR:

6 units (Djerassi) not given 1994-95

151. The Rise of Scientific Medicine — (Same as History 133A, History and Philosophy of Science 154.) Intellectual, social, and institutional dimensions of the rise of scientific medicine in the 19th century. How did medicine become “scientific”? What differences did it make to the physician? Why did it displace other approaches to medicine? Focus is on France, Germany, and England from 1750 to 1912 and U.S. from 1890 to 1912. Development of experimental physiology and biomedical technology and their contributions to the medical revolution. Concrete relationships of scientific developments in physiology, pharmacology, and bacteriology and effects on medical practice and therapy. Patterns of professionalization of medicine in different nations. Were forces driving professionalization of medicine in these contexts the same or different? How did institutional structure of the medical profession differ according to local context?

4 units (Lenoir) not given 1994-95

152. The Darwinian Revolution — (Same as History 133; History and Philosophy of Science 152; Philosophy 152; Science, Technology, and Society 130.) Conceptual developments leading to establishment of the major unifying paradigm of biological science, the theory of evolution by natural selection. Biological thought before Darwin, 1750 to 1836. Formation of Darwin’s thought in terms of its broader intellectual and social context; the Origin of the Species. Difficulties the theory had to overcome and their resolution in the union of evolutionary biology and population genetics. DR:

4 units (Staff) not given 1994-95

154. Biosocial Aspects of Cancer — Recent advances in the biology, diagnosis, and treatment of cancer. Exploration of 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? Examination of 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: Human Biology 11/Psychology 140, consent of the instructor.

5 units, Spr (Dement, Rosekind)

156. Human Development — (Same as Biology 154.) Biological, medical, and social aspects of normal and abnormal human development. Topics: in vitro fertilization and embryo transfer; gene and cell therapy; gametogenesis and imprinting; 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 cocaine, alcohol, and teratogens; sex determination and differentiation; growth control; gigantism and dwarfism; neural tube defects; cardiac morphogenesis; development of our current knowledge of 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.

5 units, Aut (Porzig)

157. Biological Basis of Behavior — (Same as Psychology 148.) 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 adaptions in animal systems.

3 units, Spr (R. Fernald)

158. The Black Death and Medieval Responses to Plague: The AIDS of the 14th Century — (Same as History 111.) What is the legacy of epidemic disaster? The plague that killed one-third of Europe’s population in 1348-49 and continued to haunt Europe through the 17th century. The modern experience of AIDS. How the experience of plague transformed the economy, society, thought, and practice of medicine. The impact of plague on modern thought in inspiring a history in which the major players are microbes and rats; and as metaphor (in Camus's The Plague and Bergman's The Seventh Seal).

5 units, Spr (Smoller) MTWTh 10

162. Ode to the Code—Molecular biology focusing on the nature and expression of biological information. The basic scientific discoveries that underlie the recent explosion of breakthroughs in the field of biotechnology. Unique molecules that make up all living things. The nature of biological information (DNA), its discovery, its structure, how it carries its information, and its parallels with human language. The expression of that information into messenger RNA and protein. The unifying principles surrounding the biology of life and exceptions to these rules. The mechanisms by which biological information is turned on and off (gene expression); cancer genes as an example of this process. The applications and implications of the scientific revolution in our ability to manipulate molecules. Issues of DNA sequencing, PCR, recombinant technology, the human genome project, and gene therapy. Scientific background is a springboard to discussion of the broad ethical challenges posed by this technology: challenges to the individual, medicine, business and industry, and society.

4 units, Aut (Siegel)

164. Topics in Socio-Cultural Studies of Biotechnology — (Same as Anthropology 162A, History and Philosophy of Science 162.) Current literature in socio-cultural 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.

5 units, Win (Fujimura)

166. Cardiovascular Disease Prevention and Epidemiology — Epidemiological, biological, and behavioral perspectives of cardiovascular disease and assessment and modification of risk factors relating to it. The potential for disease prevention examined in 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, Aut (King)

167. Molecular Biology of Central Nervous System Development — Molecular events underlying development of the mammalian central nervous system (CNS). Topics: embryogenesis, neurulation and neurogenesis of CNS, gene structure and regulation of gene expression, molecular controls which determine CNS development, general neurochemistry, and control of biochemistry events taking place in neurons as development unfolds. Genetic diseases in animals and humans illustrate the critical role of heredity in CNS maturation and function. Draws heavily on principles of regulatory biochemistry, neurobiology, and molecular biology. Prerequisites: 3A, 4A or Biology 31, 32. Recommended: Biology 153 and/or 154; prior course work in cell biology, biochemistry, neurobiology, and molecular biology.

5 units (Wong) not given 1994-95

168. Medical Anthropology — (Same as Anthropology 168.) For students with interests in health care, any major. Introduction to curing systems in our own and in non-Western cultures; problems of adapting modern medicine to diverse cultures; explanation of the social and cultural correlates of physical and mental health and disease (social epidemiology). DR:9(5)

5 units, Win (Barnett)

169. Women, Sexuality, and Health — (Same as Feminist Studies 146.) Health concerns of women. Topics: menstrual cycle disorders, contraception, infertility, pregnancy, menopause, nutrition, exercise, aging, stress, addictive disorders, sexuality, and women and the health care system. Issues considered from a social, psychological, and feminist perspective. DR:9t(4)

4 units, Spr (Matteo)

170. Gender and Science — (Same as Anthropology 160, Feminist Studies 147A, 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. DR:9t(5)

5 units, Aut (Fujimura)
171. Adolescence—Adolescence from anthropological, sociological, psychological, and psychiatric perspectives. Topics: physical, physiological, and cognitive development; identity, peer group, parent/child relations; impact of school and college, vocational development, and problem outcomes. Prerequisites: Human Biology core or Psychology 111, and statistics course. 4-5 units, Win (S. Feldman) TTh 3:15-5:05

173. Medical Ethics—(Same as Philosophy 78.) Introduction to ethical theory followed by discussion of such topics as models of the doctor-patient relation, confidentiality, informed consent, abortion, euthanasia, criteria for death, distribution of scarce medical resources, genetic manipulation. 4 units, Spr (Kamm)

177. Social Psychology of Physical Deviance and Disability—(Same as Psychology 177.) Issues faced by the disabled and the physically deviant. Focus: interaction problems (short term and long term). Emphasis is on experiences of disabled persons in situations of everyday life. 3 units, Aut (Hastorf, Scott) TTh 11-12:15

178. Aging: From Biology to Social Policy—(Same as Anthropology 140.) 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 interactions between biological processes of aging and social status of the elderly in various cultures? What are the cultural, social, and economic consequences of a large population of elderly people? What implications do they have for social policy? Readings, lectures, films. Students are assisted in research projects and working with the elderly. Those with strong clinical interests should enroll in Medicine 210. DR:9(5*) 3-5 units, Spr (Barnett)

179. Advanced Neurosciences Laboratory—(Same as Biology 209.) The use of equipment and techniques required to record and analyze extracellular and intracellular neural activity in vertebrates and invertebrates. In-depth training in a subset of these techniques as applied to a specific research project. Enrollment limited to 10; admission by application in Student Services office. Prerequisites: Biological Sciences or Human Biology core sequence and core lab (44 or equivalent). Recommended: some advanced course work in neurobiology. 4 units (Heller, Staff)

182. Peasant Society: Economy and Environment—(Same as Anthropology 149A.) Until WWII, peasants were a majority of the population. Now they are a minority everywhere except in S. and E. Asia and sub-Saharan Africa, a dramatic transformation of agrarian society. Peasant and semi-prole-
196. Molecular Neurobiology Seminar—(Same as Psychiatry 270.) Advanced topics in neurochemistry, emphasizing molecular biological approaches to studying the nervous system. Students select topic, critically read the cited literature and additional relevant papers, and prepare a presentation reviewing the primary references listed. Prerequisite: introductory course in neurochemistry (i.e., 167, Neurobiology 200).

3 units, Spr (Wong)

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) by arrangement

198. Honors Program—Students explore research interests and available opportunities with faculty adviser and director of academic programs after they declare the major. Two sponsors, one a member of Human Biology faculty, are required to approve a project and written proposal. Students attend periodic seminars and write two drafts for research paper. At project conclusion, a final paper providing evidence of rigorous research, fully referenced, and written in an accepted scientific style is submitted to the program. At honors symposium, students give a 10-minute oral presentation followed by a brief question and answer session. Minimum 1 unit per quarter, 10-15 total.

1-15 units (Porzig) by arrangement

198A. Human Biology Honors Seminar—Limited to junior and senior Human Biology honors candidates. Weekly seminar considers writing honors proposals, research grant applications, and honors theses. Speakers include honors students, faculty, and statistical and writing consultants. Prerequisites: admission to the Human Biology honors program. May be taken once during the junior and once during the senior year for credit.

1 unit, Win (Porzig)

199. Directed Reading/Special Projects—Independent study. Students must consult with program's course coordinator for requirements.

1-4 units (Staff) by arrangement

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) by arrangement

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—DR:6(8)

5 units, Aut (Hajek)

HUMANITIES SPECIAL PROGRAMS

Emeriti: (Professors) Paul H. Kocher, Lawrence V. Ryan
Chair: Paul Robinson
Professor: Kurt Mueller-Vollmer (German Studies and Humanities)
Teaching and Program Coordinator: Helen Brooks (English and Humanities)

Honors Program Committee in Charge: (Chair) Paul Robinson (History); Helen Brooks (English and Humanities), Gregory Freidin (Slavic Languages and Literatures), Robert Harrison (French and Italian), Andrea Nightingale (Classics), Alice Rayner (Drama)

Graduate Program Committee in Charge: (Chair) Paul Robinson (History); Karol Berger (Music), Helen Brooks (English and Humanities), Eckart Förster (Philosophy), Hester Gelber (Religious Studies), Suzanne Lewis (Art), Kurt Mueller-Vollmer (German Studies and Humanities), Andrea Nightingale (Classics), Rush Rehm (Drama)

Humanities Special Programs include:
1. Honors Program in Humanities
2. Graduate Programs in Humanities
   a) Master of Arts
   b) Joint Ph.D.
3. American Studies (see the "American Studies" section of this bulletin.)
4. Medieval Studies (see the "Medieval Studies" section of this bulletin.)

HONORS PROGRAM

The Honors Program in Humanities aims to heighten a sense of the relations among various humanistic disciplines, and to increase awareness of the basic humanistic values—intellectual, aesthetic, literary, historical, social, and ethical.

ADMISSION

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 three quarters of the Cultures, Ideas, and Values (CIV) Area 1 requirement, except in the case of transfer students, who must petition for exception. (Students may apply to the program while enrolled in the third quarter of CIV.)

2. A letter grade indicator (LGI) of at least 3.3 (B+) in all course work in the humanities. Such course work includes any CIV track and all freshman English 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.

After admission to the program, students may enroll as Humanities honors majors through one of the following alternatives:

1. Choose a major in Humanities honors concentrating in Modern Thought and Literature and submit a study plan approved by one of the designated Modern Thought and Literature undergraduate advisers (see the "Modern Thought and Literature" section of this bulletin). The Modern Thought and Literature concentration is open to students whose interests are in cultural studies.

2. Propose and receive approval of a 40-unit concentration of interdepartmental course work constituting a unified program of study that is not encompassed by any other undergraduate major at Stanford (for example, Medieval studies, modern visual esthetics, baroque studies.) Students who wish to major in Humanities honors should enter the program and receive approval of their concentrations before the end of the first quarter 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.

REQUIREMENTS

1. Humanities 160: 5 units, sophomore year. Prerequisite: completion of Area 1 requirement (CIV).
2. Unless students have strong intellectual reasons for doing otherwise, they must fulfill their "World Cultures" (Area 2) and "American Cultures" (Area 3) 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 average LGI of 3.0 (B) in all course work in order to remain in the program.

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. program coterminally with their bachelor's degrees. The deadline for applying to the A.M. program is March 15 of each year 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 coterminous program should speak with the department administrator about the application procedures for coterminous students.

JOINT Ph.D.

The Graduate Program in Humanities (GPH) supplements the Ph.D. programs of certain students, especially in 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, with an interdepartmental program devoted to the study of the Western tradition. The GPH offers a systematic introduction to major humanistic texts and ideas from Classical Greece to the present, as well as an examination of the issues of interdisciplinary study in the humanities. The degree offered is a joint Ph.D. in Classics and Humanities, English and Humanities, German Studies and Humanities, and so on.

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 the four historical seminars sequentially (Humanities 311-314), followed by the core seminar on interdisciplinary study in the humanities (Humanities 315), and culminating in the GPH student symposium. Students must have the chair’s consent to take seminars out of sequence.

REQUIREMENTS

1. Continue satisfactory work in the student’s major field, in accordance with department requirements.
2. Complete the four historical 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.

61. The Ancient Near East, Greece, and Rome — DR: 1 (three-quarter sequence)
   5 units, Aut (McCall, Staff)
62. The Middle Ages and the Renaissance — DR: 1 (three-quarter sequence)
   5 units, Win (Evans, Staff)
63. The Enlightenment to the Present — DR: 1 (three-quarter sequence)
   5 units, Spr (Harvey, Staff)

110A,B,C. Seminar: Topics in Cultures, Ideas, and Values — Advanced undergraduate seminar for students concurrently enrolled in 61, 62, 63. Opportunity to go beyond the requirements of the Humanities CIV sequence in a seminar of fewer students. Reading list from 62 and 63 constitutes the primary textual material. Materials and guest speakers are arranged in consultation with the enrolled students. Completion of 110 does not substitute for work
required in the CIV sequence. Prerequisite: consent of Teaching and Program Coordinator.

2 units, Aut (Brooks, McCall) Win, Spr (Brooks)

120. Sophomore Dialogues: Literature and Its Readers — For sophomores only. How texts establish conditions for their interpretation. Students become more proficient in analyzing literary works once they begin to understand their role as readers in the production of meaning. Authors: Donne, Shakespeare, Browning, Joyce, Woolf, Stevens, Beckett. Enrollment limited to four. Meets once a week for one and one-half hours.

2 units, Win (Brooks)

160. Introduction to the Humanities Honors Program — Themes and issues as treated in important works from various disciplines in the humanities. Prerequisites: completion of CIV requirement and enrollment in Humanities honors program.

5 units, Aut (Brooks) 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) by arrangement

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.

192H. Opera and the Humanities
5 units, Aut (Lindenberger)

193G. Philosophy and the Humanities: Philosophical Art
5 units, Aut (Guttmann)

194B. Literature and the Humanities: Interpretive Approaches
5 units, Spr (Brooks)

195M. Language, Culture, and the Humanities
5 units, Win (Mueller-Vollmer)

197F. Modernism and the Humanities: Tolstoy's Anna Karenina and the Social Thought of Its Time — (Same as Slavic Languages and Literatures 190.) Authors: J. S. Mill, Marx, Nietzsche, Weber, Durkheim, Freud.

5 units, Win (Freidin)


5 units, Spr (Rayner)

200A, B, C. Honors Essay — Limited to Humanities honors students. A critical essay of about 15,000 words.

200A. Essay Proposal — Preliminary planning and study. Approval of proposal by Committee-in-Charge required for credit and for continuation in the program.

2 units (Staff) by arrangement

200B. Honors Essay: Continued Study and Writing — Regular meetings with tutor. Prerequisite: 200A.

1-5 units (Staff) by arrangement

200C. Honors Essay: Conclusion — Regular meetings with tutor; submission of complete first draft to tutor by end of quarter. Prerequisite: 200B.

1-5 units (Staff) by arrangement

GRADUATE

275. Directed Reading
1-5 units (Staff) by arrangement

298. GPH Symposium
1-3 units, Spr (Robinson) by arrangement

299. Internship
1-3 units (Brooks) by arrangement

311,312,313,314,315. Graduate Program in Humanities Seminars — Required of students in GPH. Open to other graduate students only by consent of the instructor.

311. Classical Seminar
3-4 units, Aut (Nightingale) TTh 4:15-6:05

312. Medieval Seminar — (Same as Art 312.)
3-4 units, Win (Lewis) TTh 3:15-5:05

313. Early Modern Seminar
3-4 units, Aut (Fürster) MW 4:15-6:05

314. Modern Seminar
3-4 units, Win (Mueller-Vollmer) MW 4:15-6:05

315. Graduate Core Colloquium: The Interdisciplinary Study of the Humanities
3-4 units, Spr (Robinson) TTh 4:15-6:05

INTERNATIONAL POLICY STUDIES (IPS)

Co-Chairs: Barton J. Bernstein (History), Coit D. Blacker, (Institute for International Studies)

The IPS program is administered through the International Relations Program.

GRADUATE PROGRAM

MASTER OF ARTS

The IPS program is an interdisciplinary curriculum designed to provide a liberal education and to prepare students for an internationally-oriented career in the private sector or in gov-
from Stanford who did not apply in their senior year. Applicants from schools other than Stanford or applicants supporting credentials is November 11 of the senior year.

Training in accounting and computer science and proficiency in one modern foreign language are also elements of the program. IPS requires the completion of 45 units of approved courses (which may include accounting and computer science but not course credit for foreign language), at least 25 units of which must be at the graduate level.

ADMISSION

New enrollment in the program is limited annually to about 15 students. Admission requires a letter grade indicator (LGI) average of 3.5 or higher in the major and overall. 

Students may enter the program in two different ways:

Early Admission for Stanford Undergraduates—Undergraduates at Stanford may apply for admission during their senior year. Those admitted are regarded as participants in a coterminus degree program involving their undergraduate major department and this program. 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. Application is made through the International Relations office, Bldg. 200, room 17. Before making formal application, students should review a statement entitled "The Master of Arts Program in International Policy Studies," available in this office. Students should obtain from the Graduate Degree Support Section of the Registrar's Office an Application for Admission to Coterminus Degree Program, and enough copies of the Preliminary Program Proposal to chart their proposed course list from the present to the point at which they will qualify for the master's degree. Once completed and approved by the undergraduate departmental representative, the application, yearly program sheets, and transcript should be filed at the International Relations/International Policy Studies office, Bldg. 200, room 17. The closing date for filing applications and supporting credentials is November 11 of the senior year.

Admission at the Graduate Level—Applicants from schools other than Stanford or applicants from Stanford who did not apply in their senior year should submit the form entitled Graduate Admission Application and provide a statement setting forth relevant personal, academic, and career plans and goals, transcripts, three letters of recommendation, and Graduate Record Examination (GRE) scores. 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, including, among other materials, one paper of at least ten pages and three recommendations, by the preceding January 2.

DEGREE REQUIREMENTS

The A.M. degree in International Policy Studies is awarded to students who fulfill the following requirements:

1. Meet satisfactorily all department, University, and program requirements for the A.B. degree. It is expected that most participants in the program will be undergraduate majors in international relations, political science, or economics. While other backgrounds are possible and acceptable, it seems improbable that they would supply any very substantial amount of the prescribed undergraduate preparation. In such cases, it would be necessary for the student to make up the missing undergraduate work, and the time required to qualify for the A.M. degree would increase correspondingly.

2. Complete satisfactorily all requirements for the A.M. degree in International Policy Studies. These are described in detail in the aforementioned statement on International Policy Studies, and set forth in "Degree Requirements: Fields and Courses." The requirements include specified courses and seminars normally to be completed in the space of five years (four undergraduate and one graduate). Forty-five of these units must be completed while enrolled for three terms with graduate standing at Stanford. Course work done in fulfillment of requirements for the undergraduate major may not be used to meet the 45-unit master's degree requirement. Twenty-five of the 45 units used to complete the master's degree must be at the graduate level; these are normally taken during a coterminus student's fourth or fifth year. Students entering the program at the graduate level, however, can receive degree credit for these 25 units only if the work has been done during their graduate enrollment at Stanford. Students are expected to include in their program at least one graduate-level course or seminar that requires a substantial research paper.

3. 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. On this form, students should list the 45 units fulfilling the IPS field requirements. Coterminal students must be sure to list 45 unduplicated units, that is, units for courses not counted toward the undergraduate degree.

4. 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.

FINANCIAL AID

Undergraduate financial aid is not normally available for coterminal students completing the fifth year. University-based financial aid is not available for graduate students entering the IPS program.

GRADE REQUIREMENTS

During enrollment in the IPS program, students may take only one of the two required “skills” courses for Satisfactory/No Credit, and they may also take one other course in IPS for Satisfactory/No Credit. Not counting “skills” courses, IPS students must maintain at least an average LGI of 'B-', and grades under 'B-' except in “skills” courses cannot be used toward the 45 units normally required in IPS.

The records of IPS students are normally reviewed during the summer after the beginning of their course work, and students who are not making adequate progress will receive a warning. In cases where the record is poor, the student’s participation in the program may be terminated.

INTERNATIONAL RELATIONS

Co-Chairs: Barton J. Bernstein, Coit D. Blacker (Institute for International Studies)

Committee in Charge: Barton J. Bernstein (History), Peter Duus (History), Judith L. Goldstein (Political Science), Terry Karl (Political Science), Stephen Krasner (Political Science), Scott Pearson (Food Research Institute), Jeffrey Williams (Food Research Institute)

Affiliated Faculty: David Abernethy (Political Science), Masahiko Aoki (Economics), W. Brian Arthur (Food Research Institute), Paul Basch (Health Research Policy), Joel Beinin (History), Barton J. Bernstein (History), Coit Blacker (Institute for International Studies), Byron Bland (Institute for International Studies), Frederick Bowser (History), Rudy Busto (Religious Studies), Gerhard Casper (President), Wilfrido Corral (Spanish), Carol Delaney (Anthropology), Larry Diamond (Hoover Institution), Charles Drekmeier (Political Science, emeritus), Jean-Pierre Dupuy (French and Italian), Lynn Eden (Institute for International Studies), Walter Falcon (Institute for International Studies), Robert Fleck (Public Policy), George Fredrickson (History), Geoffrey Garrett (Business), Kurt T. Gaubatz (Political Science), James Gibbs (Anthropology), Stephen Gish (History), Judith Goldstein (Political Science), Avner Greif (Economics), Akhil Gupta (Anthropology), Robert Hamerton-Kelly (International Strategic Institute), Donald Harris (Economics), Gabriel Hecht (History and Philosophy of Science), David Holloway (Political Science), Kennell Jackson, Jr. (History, on leave Autumn, Winter), Harold Kahn (History), Terry Karl (Political Science), Anjini Kochar (Economics), Stephen D. Krasner (Political Science), Anne Krueger (Economics), Paul R. Krugman (Economics), Lawrence Lau (Economics), John Lewis (Political Science), John Litwack (Economics), Mark Mancall (History), Michael May (Engineering-Economic Systems), Robert McGinn (Science, Technology, and Society), Ronald I. McKinnon (Economics), Gerald Meier (Business), Lincoln Moses (Statistics), Norman Naimark (History), Rozamond Naylor (Institute for International Studies), Nel Noddings (Education), Daniel Okimoto (Political Science), Robert Packenham (Political Science), Clark Reynolds (Food Research Institute), Paul Robinson (History), Aron Rodrigue (History), Thomas Rohlen (School of Education, Institute for International Studies), Nathan Rosenberg (Economics), Lee Ross (Psychology), Jorge Ruffinelli (Spanish), Scott Sagan (Political Science), Maria Sandoval (Spanish), Julie Schaffner (Economics), Philipp Schmitter (Political Science), James Sheehan (History), Clint Smith (Latin American Studies), Peter Stansky (History), Robert Wilson (Business), John Wirth (History), Pan Yotopoulos (Food Research Institute), Stephen Zipperstein (History)

Affiliated Visiting Faculty: Ben Crow (Food Research Institute), Naushad Forbes (Science, Technology, and Society), Robert Kleiman (History)

This program is an undergraduate major designed to enable students to study international relations in a variety of dimensions and from a variety of disciplinary perspectives. The program aims to educate broad-gauged citizens who will be sensitive to the complexities of relations among different cultures, sophisticated in their ability
The A.B. in International Relations (IR) requires completion of at least 50 units in the major clusters (A, B, and C) and a minimum of 10 units in related work. Work in the cluster includes both Political Science 35, International Politics, one designated course in American foreign policy, and at least one seminar or colloquium; related work refers to social science or history courses dealing with the student’s geographical or topical area of concentration, or economic analysis (Economics 51, 52). Each IR major is required to demonstrate proficiency in a language other than English, equivalent to at least two years of university-level instruction, and is expected to study overseas as in the Stanford Overseas Studies Program, or its equivalent. IR majors must take at least two courses in the Department of Economics. To fulfill this requirement, two Economics courses may be selected in Cluster C, or one may be in Cluster C and either Economics 51 or 52 (or both) may be taken as related work. (Economics 51 and 52 may not be counted in Cluster C.) One course in the major may be taken for a Satisfactory/No Credit grade.

Other course requirements depend on the cluster which the student chooses as the focus for his or her program. Cluster A includes courses that emphasize the political and historical aspects of international relations. Cluster B focuses on humanistic aspects of relations among national cultures. Cluster C constitutes a set of policy-oriented courses, largely on political-economic issues. All students must take at least two courses in the humanities-cultural area (Cluster B), at least five courses in one of the two remaining areas, and three courses in the other.

The International Relations major must be declared before the senior 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 also are required to file a proposal before the senior 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 in the International Relations office. Petitions should contain as much information as possible about the course in question (syllabi, reading lists, examinations, papers, etc.). No course should be proposed for inclusion in the major unless more than half the course work deals with international material. (“International” here means “transactional,” that is, dealing with real-life relationships among national or cultural units as distinguished from relationships that exist only in the mind of the observer, such as comparisons.) Extradepartmental courses and freshman and most sophomore seminars are not counted toward the major.

Students are encouraged to shape their programs so that coherent central themes emerge, around which they can organize their reading and thinking about international relations.

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 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. Honors thesis students are required to discuss, in a series of informal sessions with other students in the program and faculty sponsors, their research methods, problems, and findings.

Prerequisites for participation include a 3.5 letter grade indicator (LGI) in International Relations courses, a strong overall academic record, successful experience in writing a research paper, and submission of an acceptable thesis proposal. Normally, students receive 15 units of credit, spread over three quarters, for the honors project. Five of these units may count toward the required 50 units in the major; an additional 5 may be used toward the requirement of 10 units of related course work.

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 PROGRAMS

MASTER OF ARTS

It is possible for students majoring in International Relations to work simultaneously for a coterminous master's degree in a number of related fields. Coterminous 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

Course offerings often change after this bulletin is sent to the printer. For updated information, see the quarterly **Time Schedule** and course lists available in the International Relations office.

CLUSTER A: POLITICAL-HISTORICAL EMPHASIS

ANTHROPOLOGY

234. Seminar on African Law
5 units, Win (Gibbs)

ECONOMICS

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-WWI. Topics: attitudes toward technology and science, demography, institutional changes, politics and military technology, and production technology. (Cluster A or C.)
5 units, Win (Greif)

227. European Economic History — (Cluster A or C.)
5 units, not given 1994-95

GERMAN STUDIES

52D. Readings in Political Science and International Relations — In German
3-4 units, Aut (Staff)

HEALTH RESEARCH AND POLICY

270. International Health
2-4 units, Spr (Basch) Th 1:15-3:05

HISTORY

24B. Russian Civilization II: 18th to 20th Centuries
3 units (Emmons) not given 1994-95

85S. Introductory Seminar: Jews and Moslems — DR:2(*)
5 units (Rodrigue) not given 1994-95

119. Aristocracy and Absolutism: Early Modern Eastern Europe, 1300-1800 — DR:9(5)
5 units (Kollmann) not given 1994-95

125. 20th-Century Eastern Europe — Major historical trends in 20th-century E. European history. Empires and national movements. The creation of independent Eastern Europe after WWI; social movements and the emergence of dictatorships and fascism in the interwar period. WWII, Stalinism, and de-stalinization in contemporary Eastern Europe.
5 units, Aut (Naimark) MTWTh 11

127D. 20th-Century Germany — DR:9(5)
5 units, Win (Sheehan) TTh 1:15-3:05

134A. The Industrial Revolution: Historical and Cultural Perspectives — DR:9(5)
5 units, Aut (Hecht) TTh 11-12:30

135A. The Nuclear Age
5 units (Hecht) not given 1994-95

145. 20th-Century Britain — DR:9(5)
5 units, Spr (Stansky) TTh 1:15-2:30

146. Modern South Africa
5 units, Aut (Gish) MTWTh 10

148. Introduction to African History
5 units (Jackson) not given 1994-95

149. Africa since 1935
5 units (Jackson) not given 1994-95

149A. East Africa in History
5 units (Jackson) not given 1994-95

165C. The United States in the 20th-Century — (Fulfills the American Foreign Policy Requirement.)
The major political, economic, social, and diplomatic developments in the U.S. since the end of the 19th century. Themes: debates over the proper economic and social role of government (the Progressive, New Deal, Great Society, and Reagan-Bush eras); ethnic and racial minorities in American society (during periods of mass immigration at the turn
of the century and since 1965, and in the civil rights era of the 1950s and 60s; the changing status of women (since WWII); shifting ideological bases, institutional structures, and electoral characteristics of the political system (the New Deal and post-Vietnam eras); and the determinants of U.S. foreign policy (in WWI, WWII, and the Cold War). DR:9(5)

4.5 units, Win (Bernstein) MTWThF 1:15

172A. America since 1945 — (Fulfills the American Foreign Policy Requirement.) Analyzes foreign policy and politics, and deals with social themes and intellectual history. DR:9(5)

5 units, Spr (Kennedy) MTWTh 9

175. Spain in America, 1492-1825 — DR:9(5)

5 units (Bowser) not given 1994-95

179. History of Mexico — DR:9(5)

5 units (Bowser) not given 1994-95

180. 20th-Century Brazil

5 units, Spr (Wirth) MTW 9

187B. Middle East in the 20th Century — Surveys the history of the Middle East since WWI, focusing on the eastern Arab world, Egypt, the Fertile Crescent, and the Arabian Peninsula (The Mashrig) with some attention to Turkey, Iran, and Israel.

5 units, Win (Beinin) MTWTh 11

192C. Modern China, 19th and 20th Century — DR:2(*)

5 units (Van Slyke) not given 1994-95

194D. The Rise of Modern Japan — DR:2(*)

5 units (Duus) not given 1994-95

207. Undergraduate Colloquium: Topics in Comparative Women’s History — DR:9(5)

5 units (Brown, Freedman) not given 1994-95

212S. Undergraduate Research Seminar: War-time and Postwar Poland

5 units (Naimark) not given 1994-95

224. Undergraduate Colloquium: Stalinism in Eastern Europe

5 units (Naimark) not given 1994-95

228S. Undergraduate Research Seminar: War and Society in the 20th Century

5 units (Sheehan) not given 1994-95

246A. Undergraduate Colloquium: African History and African Novel

5 units (Jackson) not given 1994-95

246S. Undergraduate Colloquium: Research Seminar: East Africa in Transition, 1880s -1920

5 units (Jackson) not given 1994-95

247A. Undergraduate Colloquium: African Identity in a Changing World

3-5 units (R. Roberts) not given 1994-95


5 units, Aut (Kleiman) TTh 3:15-5:05

259. Undergraduate Colloquium: Black and White in the United States and South Africa

5 units, Win (Fredrickson)

261. Undergraduate Colloquium: Nuclear Weapons — Theories and History — Case studies involving nuclear weapons and related international relations theory.

5 units, Spr (Holloway, Bernstein)

263. Undergraduate Colloquium: The Creation of North America

5 units, Spr (Wirth) T 3:15-5:05

278. Undergraduate Colloquium: Historical Aspects of Underdevelopment in Latin America — (Cluster A or C.)

5 units (Haber) not given 1994-95

280. Undergraduate Colloquium: Modern Mexico

5 units (Haber) not given 1994-95

286. Undergraduate Colloquium: Economic and Social History of the Modern Middle East

5 units, Spr (Beinin) W 1:15-3:05

287S. Undergraduate Research Seminar: Topics in the Modern History of Egypt and Palestine

5 units (Beinin) not given 1994-95

288. Undergraduate Colloquium: Palestine and the Arab-Israeli Conflict—The Palestine-Zionist conflict from 1882 to the present through reading and comparing representative expressions of competing historical interpretations. U.S. policy towards the conflict since 1948.

5 units, Aut (Beinin) W 1:15-3:05

289A. The Ottoman Empire — DR:2(*)

5 units (Rodrique) not given 1994-95

290. Undergraduate Colloquium: United States and Japan

5 units (Duus) not given 1994-95
291A. Undergraduate Colloquium: Industrialization of Japan  
5 units (Duus) not given 1994-95

292. Undergraduate Colloquium: Postwar Japan  
5 units (Duus) not given 1994-95

295A. Undergraduate Colloquium: The Korean War—Watershed in Asia  
5 units (Van Slyke) not given 1994-95

303C. Graduate Colloquium: The Process of Industrialization—Europe, the United States, and Latin America  
4-5 units (Haber) not given 1994-95

352. Graduate Colloquium: Decision-making in International Crisis  
4-5 units, Win (Bernstein) T 2:30-5

LATIN AMERICAN STUDIES

191. Undergraduate Seminar: Problems in United States-Mexico Relations—Overview of problem areas in the relationship between the U.S. and Mexico. Historical survey of U.S.-Mexico economic and social relations, trade problems, foreign debt crisis, foreign investment, agriculture, energy policy, immigration policies, and labor markets. Enrollment limited to 15. Prerequisite: consent of instructor by application at Bolivar House. DR:9(5)

20. Introduction to Comparative Politics  
5 units, Spr (Staff)

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. Impact of colonialism on post-colonial political and economic systems. DR:2(*) or 9(5*)

35. International Politics—Approaches to the study of world politics including realism, Marxism, and bureaucratic politics. WWI, the nuclear arms race, and international economic relations. The normative and policy implications of different theories. DR:9(5)

38. The International Security in a Changing World—Introductory survey of international and regional security relations from the closing days of WWII to the collapse of the Soviet Union and the onset of the post-Cold War era. Interdisciplinary faculty lecture on arms control and the nuclear arms race; the military legacy of the Cold War; sources of conflict in the post-Cold War world; regional security issues; the proliferation of advanced weapons technologies; and peacekeeping, peacemaking, and the resolution of international conflict.  
5 units, Win (Blacker, Holloway)

99B. Peters Seminar: Evolution of Sovereignty  
3 units, Win (Krasner)

99D. Sophomore Seminar: European Integration  
5 units (Schmitter)

113A. Politics and Development in Latin America—(Cluster A or C.)  
5 units, Spr (Packenham)

114K. The Political Economy of Development—DR:2(*) or 9(5*)

115. Politics in the People's Republic of China—DR:2(*) or 9(5*)

116. European Politics and Society—The Integration of Europe  
5 units (Schmitter) given 1995-96

116L. Social Foundations of Democracy  
5 units, Spr (Diamond)

118A. Political Change in Tropical Africa—DR:2(*)

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. DR:2(*) or 9(5*)

122G. The Political Economy of Contemporary Europe—Analysis of the decline of the Keynesian welfare state and interventionist government; the reinvigoration of the European Community (1992, EMU, political union, enlargement); and the integration of eastern and western Europe. The interactive effects of political pressures (e.g., for government interventions to ameliorate market outcomes) and economic constraints (e.g., the need to compete in global markets or to attract foreign capital) on the policies pursued by national governments, domestically and on the European stage. (Cluster A or C.)

123M. Seminar: Post-Communist Politics  
5 units, Spr (Staff)

124. Seminar: Political Economy of Latin American Development—Basic concepts and theoretical
frameworks, single-country case studies, and research and political strategies regarding political, economic, and social development in Latin America. (Cluster A or C.)

5 units, Aut (Packenham)

125. The Rise of Industrial Asia — The political, economic, social, and cultural aspects of industrial development and change in Asia as a region. Prerequisite: consent of instructors. (Cluster A or C.)

5 units, Aut (Lau, Okimoto, Raphael, Rohlen)

126C. Seminar: Constitutionalism

5 units, Win (Casper)

126K. Seminar: The United States and Central America

5 units, Win (Karl)

130. How Nations Trade — Economic theory predicts that free trade is in the interests of all countries and their citizens. The historical record shows protection endemic to all of them. The relationship between economic forces that push countries in the direction of free trade and the political pressures that lead countries in the opposite. Topics: GATT, bilateral, and regional trade blocs in Europe, N. America, and E. Asia. The future of global trade and its effects on international and domestic politics. (Cluster A or C.)

5 units, Aut (Garrett, Goldstein)

133. Peace Studies — 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. Lectures on how our world is changing; the nature of peace and peaceful processes; peace at the operational level (the causes of war, building negative peace, building positive peace); peace — moral and normative considerations; peace and you.

5 units, Spr (Bernstein, Bland, Drekeimeier, Holloway, Moses, Noddings, Ross)

MTW 1:15 and by arrangement

134A. Strategy, War, and Politics

5 units, Spr (Sagan)

134B. America and the World Economy — (Fulfils American Foreign Policy requirement.) 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. (Cluster A or C.)

5 units, Win (Goldstein)

134P. The Role of Technology in National Security — 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 issues, along with 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 policymakers. For certain cases, decisions in countries other than the U.S. are examined. (Cluster A or C.)

3 units, Aut (May)

138B. Seminar: Security and Diplomacy

5 units, Spr (Lewis)

139A. Japanese Foreign Policy

5 units (Okimoto) given 1995-96

142K. International Law

5 units, Win (Gaubatz)

142S. Seminar: Managing Hazardous Technologies

5 units, Spr (Sagan)

143G. Seminar: Public Opinion in International Relations

5 units, Spr (Gaubatz)

143H. Seminar: Security Studies

5 units (Sagan) given 1995-96

143K. Seminar: Democratic States and International Relations

5 units (Gaubatz) given 1995-96

143L. Seminar: War, Peace, and Organization Theory

5 units, Spr (Eden)

212P. The Politics of International Cooperation and Regional Integration

5 units (Schmitter) given 1995-96

223. Seminar: Japanese Politics

5 units, Win (Okimoto)

224H. Seminar: The Collapse of the Soviet Union: Causes and Consequences — Analysis of the collapse of the Soviet Union in historical and comparative perspective; theoretical approaches to understanding the causes of the collapse and its consequences for world politics.

5 units, Spr (Holloway)

224K. Contemporary Issues in Latin America — Restricted to A.M. and Ph.D. students. Oriented...
toward defining individual research on contemporary Latin America.

227K. Seminar: Democratization — East, West, and South — For graduate students; advance 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; in levels of development and international context; in modes of demise and efforts at reform; in eventual institutions and practices.

5 units, Spr (Karl)

234A. American Foreign Economic Policy — Cluster A or C.

5 units (Goldstein) given 1995-96

234B. International Institutions — Cluster A or C.

5 units, Win (Goldstein)

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 globalization of Japan and China. Emphasis 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, Aut (Blacker)

243A. 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 (Goldstein)

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 paper.

5 units, Win (Sagan)

243G. Seminar on Political Theory and International Relations

5 units, Spr (Gaubatz)

244D. Theories of European Imperialism

5 units (Abernethy) given 1995-96

247G. Research Seminar on Democratic Politics and Foreign Policy

5 units, Win (Gaubatz)

PUBLIC POLICY

201. Theories of International Cooperation and Conflict

4 units, Aut (Bueno de Mesquita)

CLUSTER B:

HUMANITIES EMPHASIS

195. Ethics, International Security, and Arms Control — Ethics and the use of military force in the international system; the morality of military intervention. Collective and cooperative security and the role of international security organizations, especially the UNO. Ethical issues of weapons of mass destruction, nuclear proliferation, and the international arms trade. Recent and current case studies: the Gulf war, Bosnia, Somalia.

5 units, Spr (Hammerton-Kelly)

ANTHROPOLOGY

108. African Societies in a Changing World — DR:2(*)or9(5*)

5 units, Spr (Gibbs) not given 1994-95

159A. The Multicultural City in Europe

5 units, Spr (Delany)

CHICANO STUDIES

110. Introduction to Chicano Life and Culture

5 units, Aut (Busto)

FRENCH AND ITALIAN

377E. Limits of Economic Rationality I: The Nature of the Social Bond

3-5 units (Dupuy)

HISTORY

80. Culture, Society, and Politics of Latin America — DR:9(5*)

5 units (Haber) not given 1994-94

135A. The Nuclear Age

5 units, Spr (Hecht) not given 1994-95

136B. European Thought in the 20th Century — The important European thinkers and intellectual movements of the 20th century, from Freud to Foucault.

5 units, Win (Robinson) MTWTh 10

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; Islamic philosophy and science; relations among Islam, Christianity, and Judaism; modern currents in Islam.

5 units, Aut (Beinin) MTWTh 11
186A. Modern India: History, Society, Cultures — DR:2(*) or 9(5*)
5 units, Win (Mancall, Gupta) MTWTh 10

187C. Women in the Contemporary Middle East — DR:2† or 9†(5*)
5 units (Beinin) not given 1994-95

188B. Jews in the Medieval World — DR:9(5)
5 units, Win (Rodrigue) MWTh 1:15

188C. Jews in the Modern World — DR:9(5)
5 units, Spr (Zipperstein) MWTh 10

207. Undergraduate Colloquium: Topics in Comparative Women’s History — DR:9f(5)
5 units (Brown, Freedman) not given 1994-95

235A. Undergraduate Colloquium: Art and Society in 19th-Century Europe
5 units, Aut (Sheehan) Th 1:15-3:05

246A. Undergraduate Colloquium: African History and African Novel
5 units (Jackson) not given 1994-95

247S. Undergraduate Research Seminar: Fieldwork in Africa — Oral History, Life, and Family History
5 units (Jackson) not given 1994-95

248. Undergraduate Colloquium: Popular Culture in Africa — 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, Spr (Jackson) T 1:15-3:05

277A. Undergraduate Colloquium: Ethnicity, Class, and Identity in Latin America — The concept of ethnicity in Spanish American thought and action beginning with the conquest of the Indian population and the introduction of African slavery; the relationship between ethnic classification and the class structure within the context of miscegenation and economic development, and the emerging sense of Spanish American uniqueness in the 19th and 20th centuries, a period of political independence, the abolition of slavery, “scientific” racial theory as an explanation for underdevelopment, and (in some areas) a celebration of ethnic diversity.
5 units, Win (Bowser) Th 3:15-5:05

285A. Undergraduate Colloquium: National Identity in Israel
5 units, Aut (Mancall) M 1:15-3:05

288. Undergraduate Colloquium: Palestine and the Arab-Israeli Conflict — (Counts for either Cluster A or B.)
5 units, Aut (Beinin) W 1:15-3:05

292S. Undergraduate Research Seminar: China in the Western Imagination, 16th-20th Century
5 units, Spr (Kahn) W 1:15-3:05

99C. Sophomore Seminar: Politics through the Lens of the Contemporary Novel
5 units, Spr (Hansot)

141K. Ethics and International Relations
5 units (Gaubatz) given 1995-96

SCIENCES, TECHNOLOGY, AND SOCIETY

110. Ethics in Public Policy — 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. A Writing Across the Curriculum course. (Cluster B or C.)
DR:8(3)
5 units, Win (McGinn) MW 2:15-3:30

SPANISH AND PORTUGUESE

131B. Hispanic American Cultural Perspectives
3 units, Win (Sandoval)

160. Spanish American Literature I — DR:7(2)
3-5 units, Win (Corral)

161. Spanish American Literature II — DR:7(2)
3-5 units, Spr (Corral)

263. The Latin American Novel of the 60s: Cortázar, Vargas Llosa, García Márquez
3-5 units, Aut (Ruffinelli)

268. A New Literary Genre: Testimony
3-5 units, Spr (Ruffinelli)

CLUSTER C: POLITICAL-ECONOMIC ISSUES AND POLICY ANALYSIS

196. Environmental Issues in International Relations — Introduction to the growing field of environmental diplomacy, focusing on issues arising between industrialized and developing countries as the latter pursue economic growth strategies under conditions of rapid population growth. Economic, legal, and institutional approaches to resolving environmental disputes and protecting the global environment. Case studies represent the various approaches. Enrollment lim-
99. Peters Seminar: State, Market, and Development
   5 units, Win (Meier)

100B. Limits of Economic Rationality I: The Nature of the Social Bond
   3-5 units, Win (Dupuy)

106. The World Food Economy — 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) MW 9-10:50

113. Technology and Economic Change — DR:9(5)
   4-5 units, Spr (Rosenberg)
   optional section for extra unit

115. European Economic History — (Cluster A or C.)
   5 units, Win (Greif)

118. The Economics of Development — The economic problems and policy concerns of Third World countries. Topics: theories of economies' structural transformation during the process of economic development, inequality and poverty, agriculture and rural development, rural markets, migration, population growth, education, nutrition, and government policies. Focuses on principles, not case studies.
   Prerequisite: 51.
   5 units, Win (Kochar)

119. Development and Population Interactions in the Third World — 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, Win (Yotopolous)

120. Socialist Economies in Transition — Privatization and restructuring in Eastern Europe and the former Soviet Union. Issues: property rights, governance of firms, methods of ownership transfer including mass and voucher privatization programs, reallocation of resources across sectors, unemployment, wage policies, and other conditions for growth and stability.
   5 units, Spr (Litwack)

121. The Economies of Greater China
   5 units, Spr (Park)

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. DR:9(5)
   5 units, Spr (Harris)

123. Economic Development in Latin America — Open to advanced undergraduate students with consent of instructor. 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 economies to newly industrializing countries. The recent experience of macro-economic 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, and the Andean and Southern Cone countries).
   5 units, Spr (Reynolds) MW 1:15-3:05

124. The Japanese Economy
   5 units, Win (Aoki)

125. Economic Development Theory at Work: Can Africa Succeed? — (Same as Food Research 149/249; graduate students register for Food Research 249.) Bridges gap between economic development theory and issues that arise in practice. The African experience is contrasted to illustrate the difficulties, challenge, and ambiguities of development theory. Topics: industrialization, structural adjustment, agricultural technology, institution building, famines, environmental issues, AIDS, and corruption. Students play a multimedia computer simulation.
   5 units (Fafchamps) given 1995-96

126. Comparative Economic Situations: The Economics of Transition
   5 units, not given 1994-95

131. The Development of the Korean Economy
   5 units, Spr (Kim)

133. Population Perspectives in the Third World — Topics: population growth in the Third World; demographic terminology and methods; trends and determinants of fertility, mortality, and
migration; population growth in relation to the environment, urbanization, and development; theories of demographic change; population policies; prospects for the future.

34. Development of the Newly Industrialized Economies
5 units, not given 1994-95

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: Economics 1, 51, 52.

5 units, Aut (Krugman)
Spr (Krueger)

167. Economic Policies of the European Community — Analysis of current economic policies of the European Community and the internal market after 1992. Development of competition, transportation, and factor market policies; agricultural policy reform and changes in the food industry; external trade policy and relations with the U.S. and Japan; monetary and macroeconomic coordination and proposals for a common currency and central bank. Prerequisites: Economics 51, 52, or equivalent.

5 units, Win (Avillez)

215. Industrialization, Growth, and Economic Development
5 units, Aut (Schaffner)

217. Money and Finance in Economic Development
5 units, Spr (McKinnon)

227. European Economic History — (Cluster A or C.)
5 units, not given 1994-95

HISTORY

278. Undergraduate Colloquium: Historical Aspects of Underdevelopment in Latin America — (Cluster A or C.)
5 units (Haber) not given 1994-95

HUMAN BIOLOGY

145. Third World Development
5 units, Aut (Crow) MW 9-10:30

182. Peasant Society: Economy and Environment
4 units (Crow) not given 1994-95

POLITICAL SCIENCE

113A. Politics and Development in Latin America — (Cluster A or C.)
5 units (Packenham)
270. Poverty, Technology, and Rural Industrialization
5 units, Spr (Crow) TTh 2:15-4:05

INDEPENDENT STUDY
Students must obtain section numbers for these courses from the International Relations office before enrolling.

197. Directed Study in International Relations
3-5 units, any quarter (Staff)

198A,B,C. Honors Thesis — Open only to declared International Relations majors with approved honors thesis proposals.
3-10 units, any quarter (Staff)

OVERSEAS STUDIES
Descriptions of courses may be found in the “Overseas Studies” section of this bulletin. Pick up a copy of the latest course list in the IR office.

BERLIN
The History of German and European Economic Philosophy — (Enroll in Economics 100X.) Cluster A or C. DR:8(3)
4-5 units, Aut (Krüger)

Transition in Germany and Eastern Europe — (Enroll in Economics 128X.) Cluster C. DR:9(5)
4-5 units, Win (Krüger)

Split Images: Postwar German Film — (Enroll in German Studies 179B.) Cluster B. DR:7(2)
4 units, Spr (Kramer)

FLORENCE
The Political Economy of Industrial Change: Italy and Europe in a Global System — (Enroll in Economics 159X.) Cluster C. DR:9(5)
5 units, Win (Bianchi, Bellini)

The Integration of Europe — (Enroll in Political Science 145X.) Cluster A and C. DR:9(5)
4-5 units, Aut (D’Alimonte)

KYOTO
The Political Economy of Japan — (Enroll in Political Science 215X.) Cluster C. DR:9(5)
5 units, Spr (MacDougall)

MOSCOW
Russian Economy: Past Experience, Current Reforms, and Future Prospects — (Enroll in Economics 125X.) Cluster C.
5 units, Aut (Panova)

Russian Politics — (Enroll in Political Science 119X.) Cluster A, DR:9(5)
5 units, Aut (Bratersky)

OXFORD
4-5 units, Win (Crafts)

5 units, Aut (Kirk-Greene)

European Integration — (Enroll in History 147X.) Cluster A and C. DR:9(5)
4-5 units, Aut (Thomas)

European Imperialism and the Third World, 1870-1970 — (Enroll in Political Science 141V.) Cluster A. DR:9(5)
5 units, Spr (Darwin)

PARIS
124X. The Left in Western Europe — Cluster A.
4 units, Win (Lazar)

SANTIAGO
The Transformation of the Global Economy and its Implications for Latin American Growth — (Enroll in Economics 124X.) Cluster C.
5 units, Aut (Hachette)

Modernization and Culture in Latin America — (Enroll in Latin American Studies 120X.) Cluster B. DR:9(5)
5 units, Aut (Subercaseaux)

Democratic Consolidation in Latin America: The Southern Cone — (Enroll in Political Science 113X.) Cluster A.
5 units, Aut (Wilhelmy)

PROGRAM IN JEWISH STUDIES

Director: Steven Zipperstein
Faculty Advisory Committee: Alice Bach, Joel Beinin, Arnold Eisen, John Felstiner, Van Harvey, Roger Kohn, Seymour Martin Lipset, Mark Mancall, Norman Naimark, Jack Rakove, Aron Rodrigue, David Rosenhan, Peter Stansky

The Program in Jewish Studies brings to focus the various courses given on campus relating to Jewish history, thought, literature, and culture from biblical times to the present.

The program committee, in consultation with the committee of the Individually Designed Major (undergraduate), has worked out a pattern for students interested in devising a Jewish Studies Program within the Individually Designed Major. Such students are required to participate in
at least two Jewish Studies seminars. Faculty affiliated with the program are available to advise undergraduates who are interested. Contact the office of the Program in Jewish Studies for information, (415-723-7589).

Graduate students enroll in the program through either the Department of Religious Studies or the Department of History and must meet the requirements of that department as well as those of the program.

A series of guest lectures and conferences are an integral part of the program and its course of study.

HONORS PROGRAM

The honors program is open to students in any discipline who wish to enrich their studies through the acquisition of knowledge of Jewish history, thought, literature, religion, and society. It may also interest students who wish to consider including some aspects of Jewish Studies in graduate work or in career planning. Students in the Social Sciences and Humanities are encouraged, by combining the program with their major, to explore the field of Jewish Studies from the perspective of their particular disciplines. Contact the Jewish Studies Program for information.

PROGRAM IN JERUSALEM

A new program will open in January 1995 in Jerusalem for sophomores, juniors, and seniors. A full curriculum of English language classes is available, including a special course designed for Stanford students on the politics and culture of contemporary Israel. For further information, please contact the program in Jewish Studies, Building 60, 415-723-7589.

COURSES

ENGLISH

164B. Imagining the Holocaust
   5 units, Aut (Felstiner) MW 11-12:30

181. Seminar: The Other Middle Ages
   5 units, Aut (Narin, Van Court) TTh 11-12:30

HISTORY

188B. Jews in the Medieval World
   5 units, Win (Rodrigue) MTh 1:15-2:05

188C. Jews in the Modern World
   5 units, Spr (Zipperstein) MTh 10

204C. Peters Seminar: Jews and Muslims
   5 units (Rodrigue) W 1:15-3:05

285A. Undergraduate Colloquium: National Identity in Israel
   5 units, Aut (Mancall) M 1:15-3:05

287A. Undergraduate Colloquium: Modern Jewish Identity
   5 units, Aut (Rodrigue) Th 1:15-3:05

288. Undergraduate Colloquium: Palestine and the Arab-Israeli Conflict
   4-5 units, Aut (Beinin) W 1:15-3:05

485. Graduate Research Seminar in Modern Jewish History
   8-10 units, Win, Spr (Rodrigue, Zipperstein) Th 2:15-4:05

LINGUISTICS, FOREIGN LANGUAGES

628A,B,C. Beginning Hebrew
   4 units, Aut, Win, Spr (Berman) MTWTh 10

629A,B,C. Intermediate Hebrew
   4 units, Aut, Win, Spr (Berman) MTWTh 2:15

630A,B,C. Advanced Hebrew
   4 units, Aut, Win, Spr (Berman) MTWTh 3:15

RELIGIOUS STUDIES

15. Hebrew Bible: Issues of Power
   5 units, Spr (Back)

23. Introduction to Judaism
   4 units, Aut (Eisen)

53. Jews and Judaism in America
   4 units, Win (Eisen) MW 11-12:15

110. God and the Big Bang
   4 units, Win (Matt) TTh 11-12:15

134. Reading the Feminine in Ancient Near Eastern Text
   5 units, Spr (Bach)

231. Jewish and Christian Apocalyptics
   4-5 units, Aut (Royalty) TTh 11-12:15

321. Graduate Seminar in Modern Judaism
   4 units, Win (Eisen) MW 11:15-3:05

SLAVIC LANGUAGES AND LITERATURES

214. Biblical Apocrypha Pseudo-Epigrapha
   4 units, Spr (Arkhipov) by arrangement

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
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 which brings one or more distinguished Latin American academics to teach at Stanford each year. The Stanford-Berkeley Title VI National Resource Center for Latin American Studies provides opportunities for faculty and students on the two campuses to meet and work together.

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 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, or phone 415-723-4444.

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 toward 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, Portu-
guese 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 an LGI 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.

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 LGI 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, and 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, please 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 com-
 petitions 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**

Latin American Studies courses are also listed under Santiago 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.

**80/170. Culture, Society, and Politics in Latin America — Introduction to the economic, political, and social history of Latin America since the 15th century. Emphasis is on the interaction between economic change, social structure, and political movements, concentrating on the histories of Mexico, Brazil, and Argentina, and other national experiences. DR:9(5*) **

5 units, Win (Weffort) TTh 1:15-3:05

**87. Urbanization, Poverty, and Children in Latin America — Sophomores only. 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 (Wirth) MTW 9

**91/171. Women in the Transition to Democracy in Latin America — (Same as Feminist Studies 140A.) Comparison of how women have participated in, and been affected by, transitions to democratic politics in Brazil, Argentina, Venezuela, and El Salvador. Current political and feminist theory is used to address the impact of women of changing political and economic models, family structures, religious and ethnic influences, and feminist movements. Emphasis is on the problems and possibilities of comparison. Limited enrollment.**

5 units (Friedman) not given 1994-95

**121. 20th-Century Brazil — (Same as History 180.) Brazil is a continent-sized nation whose multi-ethnic society is at a crossroad as to 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. The Empire's demise in 1989, Brazil's rise as a middle range economic power, and the development of a dynamic national culture.**

5 units, Spr (Durham, Sawyer)

**137/271. Special Topics in Latin American Economics — (Same as Food Research 271.) Issues of economic development and integration, emphasizing the experiences of Central America. Shifts in economic thinking, case studies of specific adjustment processes and financial policies, and new approaches to regional integration in the Caribbean Basin in the wake of NAFTA.**

5 units, Aut (Lizano) MW 9-11

**138/270. Masses and Politics in Latin America — Recent political and economic changes in Latin America, emphasizing the Brazilian case. Topics: popular movements, urban poverty and politics, labor unions, the role of the state in democratic transitions, and the "new" democracy.**

5 units, Spr (Weffort)

**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; relationship between evidence and argument; practicalities of field research in developing countries; ethical and political considerations.**

5 units, Spr (Greenway)

**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) by arrangement
180. Undergraduate Colloquium: Ethnicity, Class, and Identity in Latin America — (Same as History 277A.) Readings on the concept of ethnicity in Spanish American thought and action, beginning with the conquest of the Indian population and the introduction of African slavery; the relationship between ethnic classification and the class structure within the context of miscegenation and economic development. Its relationship to the sense of Spanish American uniqueness in the 19th and 20th centuries, political independence, the abolition of slavery, "scientific" racial theory as an explanation for under-development, and (in some areas) a celebration of ethnic diversity.  
5 units, Win (Bowser) Th 3:15-5:05

181/381. Comparative Slave Societies: Brazil, the Caribbean, and the United States — (Same as History 283/383.) The distinctiveness of slave societies in the context of the history of the New World, and the similarities and differences evidenced among the three major slave holding regions over the 400 years slavery persisted as the predominant form of labor organization. A critical evaluation of the historiographical trends which marked slave studies in recent decades and on the debates which they have generated regarding economic performance, the nature of the master/slave relationship, the external and/or internal dynamics of slave systems, slave resistance and accommodation, etc.  
5 units, Aut (Libby) M 3:15-5:05

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 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, Win (Karl)

183. Undergraduate Colloquium: Historical Aspects of Underdevelopment in Latin America — (Same as History 278.) 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. Prerequisite: consent of instructor in prior quarter.  
5 units (Haber) not given 1994-95

184. Contemporary Thought in Latin America — (Same as Spanish 179.) Reading and discussion of leading currents of social and political thought. Limited enrollment. Prerequisite: consent of instructor by application at Bolivar House.  
5 units, Spr (Galeano)

185. Undergraduate Colloquium: The Agrarian Origins of Underdevelopment in Latin America — (Same as History 282.) 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 Bolivia and Mexico during the 18th and 19th centuries. Works written by development economists, social historians, and economic historians. Prerequisite: consent of instructor during prior quarter.  
5 units, Spr (Haber) Th 1:15-3:05

186. Undergraduate Seminar: Problems in United States-Mexico Relations — Overview of problem areas in the relationship between the U.S. and Mexico. Historical survey of U.S.-Mexico economic and social relations, trade problems, foreign debt crisis, foreign investment, agriculture, energy policy, immigration policies, and labor markets. Enrollment limited to 15. Prerequisite: consent of instructor by application at Bolivar House. DR:9(5)  
5 units, Aut (Smith) W 7-9 p.m.

5 units, Win (Rosset)

188. Conservation and Community Development in Latin America — (Same as Human Biology 139, Anthropology 161A.) Upper-division seminar focuses on the problems and potentials for linking management of protected areas (parks, reserves, wildlife sanctuaries, etc.) with local community development in Latin America. Case studies on national and private parks in Costa Rica, and biosphere reserves in various areas of Central and S. America. Emphasis on the impact of Western conservation efforts on indigenous peoples and the ways such efforts might be carried out with social, cultural, and economic benefits at the local level.  
3-5 units, Win (Durham, Irvine, Umaña)

189. Senior Thesis — Restricted to undergraduate majors and those writing the honors thesis in Latin American Studies.  
1-10 units, Aut, Win, Spr (Staff) by arrangement

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 1994-95
227. Seminar: Democratization-East, West, and South — (Same as Political Science 227K.) Open to graduate students, with 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; in levels of development and international context; in modes of demise and efforts at reform; in eventual institutions and practices.

5 units, Spr (Karl)

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.

250. — (Same as History 304C.)
4-5 units, Aut (Bowser) Th 4:15-6:05

251. — (Same as Political Science 224K.)
5 units, Win (Morrison, Karl) Th 3:15-5:05

252. 5 units, Spr (Staff) Th 3:15-5:05

305. Contemporary Latin America: A Critical View — (Same as Spanish 397.) Critical analysis of contemporary issues in Latin America, as seen by leading writers, artists, and other intellectuals. Limited enrollment. Prerequisite: consent of instructor by application at Bolivar House.

5 units, Spr (Galeano)

380. Graduate Seminar on Brazil — (Same as History 476.)
4-5 units, Win (Wirth) T 3:15-5:05

AFFILIATED DEPARTMENT OFFERINGS

See respective department listings for course descriptions and Distribution Requirement (DR) information.

ANTHROPOLOGY

3. Human Prehistory
3-5 units (Rick)

4. Language and Culture
4-5 units (Fox)

73 A, B, C. First-Year Yucatec Maya
3 units (Fox)

74 A, B, C. Intermediate Yucatec Maya
3 units (Fox)

75 A, B, C. First-Year Classical Nahuatl
3 units (Fox)

76. Intermediate Classical Nahuatl
3 units (Fox)

77 A, B, C. First-Year Quechua
3 units (Fox)

818. Intermediate Quechua
3 units (Fox)

93. Prefield Research Seminar
5 units (Meisch)

94. Postfield Research Seminar
5 units (Gibbs)

98A. Maya Mythology Multimedia Project
5 units (Fox)

149A. Peasant Society: Economy and Environment — (Same as Human Biology 182.)
4 units (Crow) not given 1994-95

164. Ecological Anthropology — (Same as Human Biology 134.)
3-5 units (Staff) not given 1994-95

167. Ethnography of Communication — (Same as Linguistics 147.)
4 units (Heath) given 1995-96

168. Medical Anthropology — (Same as Human Biology 168.)
5 units (Barnett)

172. Indigenous Languages of North and South America
5 units (Fox) not given 1994-95

173. Maya Hieroglyphic Writing
5 units (Fox) not given 1994-95
181. Evolutionary Anthropology — (Same as Human Biology 114.)
  5 units (Durham) not given 1994-95

239. Cultural Approaches to Education and Development — (Same as Education 306C.)
  3-5 units (McDermott) not given 1994-95

251. Issues in Cultural Studies
  5 units (Rosaldo) not given 1994-95

256. Imaginary Homelands: Constituting Diasporic Communities
  5 units (Ebron)

258. Ideology and Cultural Nationalism
  5 units (Beuf)

262. Topics in Political Economy
  5 units (Gupta)

263. Political Ecology
  5 units (Durham)

264. Advanced Ecological Anthropology
  5 units (Durham) not given 1994-95

266. Cultural Transmission: Education in Cross-Cultural Perspective — (Same as Education 315.)
  3-5 units (G. and L. Spindler)

273. Seminar in Advanced Medical Anthropology
  5 units (Barnett)

BUSINESS

301. International Economics and Policy Analysis
  5 units (Wells)

DANCE

75/175/176. Mexican Dance and Folklore I, II, III
  2 units (Cushion)

77. Dances of Latin America
  1 unit (Cushion)

177. Dance and Culture in Latin America — (Same as Anthropology 109.)
  3-4 units (Cushion)

185. African Caribbean Roots of American Jazz Dance
  2 units (Staff) not given 94-95

186. African-Caribbean Dance Technique
  2 units (Staff)

197. Argentine Tango and Swing
  1 unit (Powers)

268. Society, Education, and Dance — (Same as Education 218.)
  3-5 units (Cushion, Ross)

ECONOMICS

106. The World Food Economy — (Same as Food Research 103.)
  5 units (Falcon, Naylor)

118. The Economics of Development
  5 units (Kochar)

119. Development and Population Interactions in the Third World — (Same as Food Research 121/219.)
  5 units (Yotopoulos)

122. The Theory of Capitalist Development
  5 units (Harris)

123. Economic Development in Latin America — (Same as Food Research 218.)
  5 units (Reynolds)

165. International Economics
  5 units (Krueger, Krugman)

215. Industrialization, Growth, and Economic Development
  5 units (Schaffner)

217. Money and Finance in Economic Development
  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

163X. Technology Policy, Knowledge Formation, and Economic Development
  2-5 units (Carnoy)

197. Education and the Status of Women: Comparative Perspective — (Same as Sociology 134, Feminist Studies 139A.)
  2-5 units (Ramirez, Honig)

202X. Introduction to the Study of International Comparative Education
  3-5 units (Ramirez)

206X. Applied Research Methods in International and Comparative Education
  3-5 units (Honig)

207. Seminar: The Politics of International Cooperation in Education
  3-5 units (Honig)
242. First-Year Proseminar in Language, Literacy, and Culture
4 units (Padilla, Hakuta, Valdés)

283. Attitudes Towards Language and Language Study
4 units (Padilla)

287X. Culture and Learning—(Same as Anthropology 136.)
3 units (Bough, McDermott)

306A. Education in Economic Development
5 units (Nam)

306B. Education and Political Change
5 units (Staff) not given 1994-95

306C. Cultural Approaches to Education and Development—(Same as Anthropology 239.)
3-5 units (McDermott) not given 1994-95

306D. World, Societal, and Educational Change: Comparative Perspectives—(Same as Sociology 332.)
5 units (Ramirez)

315. Cultural Transmission: Education in Cross-Cultural Perspective—(Same as Anthropology 266.)
3-5 units (G. & L. Spindler)

335X. Language Policy and Planning: National and International Perspectives
4 units (Valdes) not given 1994-95

376. Education and Theories of the State
5 units (Carnoy)

387A,B,C. Workshop: Comparative Systems—(Same as Sociology 311A,B,C.)
2-5 units (Ramirez, Meyer)

406X. Topics in Comparative Educational Research
2-3 units (Ramirez) not given 1994-95

408. Research Workshop in International and Comparative Education
2-5 units (Ramirez)

FOOD RESEARCH INSTITUTE

136/236. Population Perspectives in the Third World—(Same as Economics 133, Human Biology 136, Sociology 153.)
5 units (Wilson)

211. International Development Policy Analysis I
5 units (Pearson, Gotsch)

212. International Development Policy Analysis II
5 units (Gotsch, Yotopoulos, Pearson)

213. International Development Policy Analysis III
5 units (Pearson, Albers, Josling)

267. Contemporary Issues in International Economic Policy
5 units (Josling)

323. Economic Development Theory
5 units (Fafchamps, Rozelle)

324. Explorations in the New Development Economics
5 units (Yotopoulos)

HISTORY

176. Spain in America, 1492-1825
5 units (Bowser) not given 1994-95

180. 20th-Century Brazil
5 units (Wirth)

276/376. Undergraduate/Graduate Colloquium: The Creation of North America
5 units (Wirth)

277A. Undergraduate Colloquium: Ethnicity, Class, and Identity in Latin America
5 units (Bowser)

306C. Graduate Colloquium: The Process of Industrialization—Europe, the United States, and Latin America
4-5 units (Haber) not given 1994-95

304A,B. Graduate Colloquium: Historiography of Colonial Spanish America
4-5 units (Bowser)

377. Regionalism in the Americas
4-5 units (Wirth) not given 1994-95

LINGUISTICS

150. Introduction to Sociolinguistics
4-6 units (Rickford)

POLITICAL SCIENCE

25. Colonialism and Nationalism in the Third World
5 units (Abernethy)

35/135. International Politics
5 units (Krasner)

113A. Politics and Development in Latin America
5 units (Packenham)

114K/314K. The Political Economy of Development
5 units (Karl) given 1995-96

124. Seminar: Political Economy of Latin American Development
5 units (Packenham)

126K. Seminar: The United States and Central America
5 units (Karl)
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Linguistics

Emeriti: (Professors) Clara N. Bush, Charles A. Ferguson, Joseph H. Greenberg
Chair: Eve V. Clark
Professors: Joan Bresnan, Eve V. Clark, Penelope Eckert, Shirley Brice Heath, Martin Kay, Paul Kiparsky, William R. Leben, Stanley Peter, John R. Rickford, Ivan A. Sag (on leave, Autumn), Elizabeth C. Traugott, Thomas A. Wasow
Associate Professor: William J. Poser (on leave)
Assistant Professor: Peter Sells
Courtesy Professor: John Baugh
Affiliated Faculty: Herbert H. Clark, Kenji Hakuta, James A. Fox, Mary L. Pratt, Orrin W. Robinson, III, Richard D. Schupbach
Senior Lecturers: Khalil Barhoum, Philip L. Hubbard, Beverley J. McChesney
Acting Assistant Professor: Henriet de Swart
Consulting Professors: Per-Kristian Halvorsen, Jerry R. Hobbs, Ronald M. Kaplan, Charlotte Linde, Geoffrey Nunberg
Consulting Associate Professor: Jared Bernstein
Consulting Assistant Professor: Mary Dalrymple
Visiting Professor: Arnold Zwicky (Winter)
English for Foreign Students
Director: Beverley J. McChesney
Associate Director: Philip L. Hubbard
Special Language Program
Coordinator: Eva Prionas
Senior Lecturer in Arabic: Khalil Barhoum
Lecturer in Hebrew: Hanna Berman
Lecturer in Swahili: John Mugane

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 sciences, 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, 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 for a '+' grade.

Core Courses — The five core courses are:
110. Introduction to Phonetics and Phonology
120. Introduction to Syntax
130. Introduction to Semantics and Pragmatics
150. Introduction to Sociolinguistics
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 de-
claring 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 (Ling. 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.

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; approval is given only to students who have maintained a letter grade indicator (LGI) 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. The essay must be submitted in final, acceptable form no later than six weeks before the date of intended graduation.

GRADUATE PROGRAMS

MASTER OF ARTS

The University’s basic requirements for the master’s degree are discussed in the “Advanced 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 letter grade indicator (LGI) must be at least ‘B’ for all degree 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.

3. Thesis or Thesis Project: a research paper supervised by a committee of three faculty; (normally fulfilled by 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 “Advanced 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 to 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 sub-areas within the field. Candidates must maintain a satisfactory record in the number and distribution of units completed. The overall course work LGI 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 395A,B, Research Workshop (2 units each), and oral discussion with a committee of at least three faculty members selected by the student and the faculty and approved by the committee.

4. Candidacy: students must complete the basic courses 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 two 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
   b) Oral presentation of the dissertation proposal, preferably as a colloquium
   c) Approval of dissertation topic and appointment of a dissertation committee
   d) Successful passing of a University oral examination 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 incremental 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 subject.

COGNITIVE SCIENCE

Linguistics is participating with the Departments of Computer Science, Philosophy, and Psychology in an interdisciplinary program in Cognitive Science for doctoral students. The program is intended to provide an interdisciplinary education as well as a deeper concentration in linguistics. Students who complete the Linguistics 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 Cognitive Science program located in the Department of Psychology.

LANGUAGE PROGRAMS

The Department of Linguistics administers a number of foreign language programs, the Special Language Program, and the Program in English for Foreign Students. Course offerings follow the Linguistics courses listed below.
COURSES
LINGUISTICS

Courses with two-digit numbers are primarily 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 primarily 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; Mathematical and Computational Linguistics
- 40-49 Language Acquisition and Psycho-linguistics
- 50-59 Sociolinguistics
- 60-69 Language Change, Language, and Culture
- 70-84 Linguistic Analysis of a Language
- 85-94 Methods
- 95-99 Directed Work, Theses, Dissertations

1. Introduction to Linguistics — The nature of human language and the methods of modern linguistics. 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, educational, and engineering problems. DR:9(4)

4 units, Win (Bresnan, Staff)

4. Language and Culture — (Enroll in Anthropology 4.) DR: 9(4 or 5)

4-5 units, Spr (Fox)

10. Seminar: Introduction to Linguistic Analysis — "Hands-on," introducing the ideas of linguistic analysis to students with a background or interest in languages. Students uncover and understand aspects of languages they are familiar with (the sound system, basic grammatical structures, usages correlated with different perceived social status, patterns of common stock in the vocabulary, etc.). Lectures, discussion, and problem-solving. Recommended: at least one year (or equivalent) of a language other than English.

4 units, Aut (Sells)

60. Introduction to Language Change — Variation and change as the natural state of language. Differentiation of dialects and languages over time. Determination 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 history: contact, migrations, the vocabulary of ancient institutions, and cultural origins of grammar. DR:9(4)

4 units, Spr (Staff)

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. DR:9(4)

4 units, Aut (Leben)

72. Point of View in Fiction: A Linguistic Approach — (Same as English 105.) Introduction to discourse analysis of short stories. Theoretical and practical materials leading to critical study of relations between story, narrator, narrative point of view, and implied reader, e.g., speech acts, literal vs. implied meaning, reported speech and thought, tense, transitivity, backgrounding and foregrounding though complex sentence structure, social and cultural variation in use of language. DR:7(2) or 9(4)

4-5 units, Win (Traugott)

73. African American Vernacular English — Survey of the English vernacular spoken by African Americans in big city settings, and its relation to Creole English dialects spoken on the South Carolina Sea Islands ("Gullah"), in the Caribbean, and in W. Africa. The history of expressive uses of African American English (in soundin', and rappin'), and its educational implications. DR:3 or 9(4)

4 units, not given 1994-95

76. History of the French and Italian Languages — (Enroll in French and Italian 275E.)

3-5 units, Win (Stempel)

80. Introduction to Conversational Analysis — (Enroll in French and Italian 276F.)

3-5 units, Win (Stempel)

85. Introduction to Methods of Teaching English as a Second Language — Practical approach to teaching English to non-native speakers, focusing on a survey of 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 (McCchesney)

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 (McCchesney)

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.

98A,B,C. Honors Research
2 units, Aut (Staff)
4 units, Win, Spr (Staff)

99. Independent Study
1 or more units, any quarter (Staff)
by arrangement

102. The History of the English Language—(Enroll in English 102.) DR:9(4)
5 units, Spr (Wade)

103. Introduction to the Runes—(Enroll in German Studies 251.)
3-5 units, Win (Robinson)

104. History of the German Language—(Enroll in German Studies 253.)
3-5 units, Aut (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, not given 1994-95

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 ability to construct and evaluate phonetic experiments and phonological analyses.
4 units, Spr (Staff)

120. Introduction to Syntax — Analyses 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.
4 units, Aut (Wasow)

121. Intermediate Syntax — Introduction to modern syntactic theory and its relation to sentence processing. Overview of selected grammatical problems from the perspective of post-transformational syntactic theory. Emphasis on English grammar, with some exposure to the syntax of other languages.
4 units, not given 1994-95

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.
4 units, Win (Peters)

135. Basic Concepts in Mathematical Logic—(Same as Philosophy 159.) 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. DR:4(6)
4 units, Aut (Wasow)

136. First-Order Logic—(Enroll in Philosophy 160A.) DR:4(6)
4 units, Win (Kremer)

138/238. Lexicon and the Dictionary — Examination of similarities and differences of approaches to lexical descriptions as they reflect different notions of “the dictionary.” Topics: roots and practice of traditional lexicography, role of the lexicon in linguistic description, and explicit lexical information that is required for development of adequate natural-language systems such as used in machine translation.
4 units, Spr (Nunberg)

139/239A. Introduction to Computational Linguistics I — 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 based on computer programs implementing key algorithms for parsing, generation, etc., done as homework exercises. Prerequisite: introductory course in Prolog programming.
4 units, Aut (Kay)

139/239B. Introduction to Computational Linguistics II — Continuation of 139/239A. Prerequisite: 139/239A or consent of instructor.
4 units, Win (Kay)

140. Language Acquisition I — See 240.
4 units, Aut (E. Clark)

145. Language and Thought — (Enroll in Psychology 146.) DR:9(4)
4 units, Aut (H. Clark) MWF 1:15

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.

4 units, Spr (Eckert)

147. Ethnography of Communication — (Same as Anthropology 167.) Language use in situations, organizations, and by members of different cultures. Speech events and the role of conversation, narratives, and performance modes in different contexts. Focuses on ethnographic methods for the study of verbal and non-verbal communication.

4 units (Heath) given 1995-96

150. Introduction to Sociolinguistics — 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. DR:9 (5)

4-6 units, Win (Rickford)

154A. Reading, Writing, and the AAVE Speaker — Review of the literature on teaching reading and writing to schoolchildren who speak African American Vernacular English (AAVE). Review of material from 1960s to present on failure rates of working class African American youth and schools' failure to recognize the systematicity, complexity, and historicity of children's vernacular. Discussion of proposals for reform in this area. Recommended: 1 or 73.

4 units, Win (Rickford)

159. Language and Culture Among Urban Youth — (Same as Anthropology 170A.) Sociocultural and linguistic studies through which urban youth have been defined and debated. Gang histories and structures, ghetto and project life, socialization of children and youth, and aesthetic expression (graffiti, vernaculars, music, drama, and pictorial art.) Case study with investigations of language and culture patterns within institutions (e.g., families, schools, youth groups, (including Boys' and Girls' Clubs, neighborhood basketball leagues, etc.), and "service" agencies. Emphasis on U.S. youth, with comparative perspectives from other nations, especially with respect to language socialization.

5 units, Win (Heath)

162/262. English Transplanted, English Transformed — Examines the transformations which took place in the English language 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). DR:9 (4*)

4 units, Spr (Rickford)

176. Introduction to the German Dialects — (Enroll in German Studies 139/259.) DR:9 (4)

3 units, Win (Robinson)

177. The Structure of Japanese — (Enroll in Asian Languages/Japanese 277.)

4 units, not given 1994-95

178. Old Saxon — (Enroll in German Studies 254.)

3-5 units, Aut (Robinson)

188. Teaching Asian Languages — (Enroll in Asian Languages/Chinese/Japanese/Korean 208.)

2 units, Win (Cho) by arrangement

189/289. Linguistics and the Teaching of English as a Foreign/Second 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, Aut (Traugott)


4 units, Win (Kiparsky)


4 units, Aut (Kiparsky)

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, Win (Kiparsky)
208. Advanced Phonology: Tone Languages — Issues in the description of tone languages from the viewpoint of autosegmental phonology, underspecification theory, and feature geometry. The Obligatory Contour Principle, the representation of contour tones, the description of intonation in a tonal language. Develops an empirically motivated typology of tonal systems.
4 units, Win (Leben)

209. Issues in Phonology: Pitch Accent — Discussion of pitch accent systems, with emphasis on their typological and formal status. Survey of so-called pitch accent systems with analysis of several, and discussion of the typology of prosodic systems, especially the relationship between pitch accent and stress between pitch accent and tone.
4 units, Spr (Leben)

210. Topics in Intonation — Introduction to the linguistic study of intonation. Survey of the literature on the phonological description of intonation and of the role of intonation in discourse. Emphasis is on American English, with intonation in a variety of other languages.
4 units, Aut (Leben)

211. Intonation Practicum — Practicum in the transcription of intonation. Methods for transcribing different aspects and styles of intonation. Practice in applying these methods.
2-4 units, Spr (Leben)

220A. Introduction to Syntactic Theory — Overview of current syntactic issues and theory, with emphasis on work based on Government-Binding theory.
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 variation, and their relation to general theoretical issues.
4 units, Win (Sag)

221A. Head-Driven Phrase Structure Grammar I — Surveys two related approaches to syntax and semantics of natural language: Phrase Structure Grammar and Categorial Grammar. Analyses of binding, unbounded (filler-gap) dependencies, agreement, word order variation, and complementation from the tradition of Generalized Phrase Structure Grammar are reviewed critically and compared with alternative approaches. Also, Montague-style categorical analyses, e.g., Bach, Steedman, and Dowty. A systematic presentation of theory of Head-Driven Phrase Structure Grammar.
4 units, Spr (Sag)

224A. Lexical-Function Grammar I — Intensive introduction to LFG. Presentation of the formal architecture for grammatical description through analytic problems in a variety of languages.
5 units, Aut (Bresnan)

224B. Lexical-Function Grammar II — Theory of LFG. Lexical mapping theory, X' theory and nonconfigurality, lexical integrity and complex predicates.
5 units, Win (Bresnan)

225. Advanced Topics in Lexical-Functional Grammar — Syntactic dependencies and their formal encoding in LFG, concentrating on relations expressible at the level of f-structure or in the mapping between f-structure and other more abstract representations. Issues surrounding the phenomenon of constituent and nonconstituent coordination and their interaction with other grammatical phenomena, particularly the interaction of coordination with nonlocal dependencies, anaphoric binding, ellipsis, and quantification.
4 units, Spr (Dalrymple, Kaplan)

228A,B. Syntax Seminar — Focuses on a topic of relevance to current syntactic theory. Each quarter the seminar is principally coordinated by one or two syntax faculty; area faculty participate throughout. Topics to be announced.
228A. 4 units, Win (Sells)
228B. 4 units, Spr (Bresnan)

229. Seminar in Syntax: Inflection and Derivation in Morphology — Takes the function of inflectional morphology to be the marking of syntactic properties and relations, and the function of derivational morphology to be the enrichment of the stock of lexemes in a language. What enables speakers of a language to assign a particular morphological formation to one or another of these types? Is such an assignment always possible, or must the two types be treated as belonging to a single undifferentiated component of grammar? Review of the literature on the differentiation of inflection and derivation and considers case studies in detail.
4 units, Win (Zwicky)

230A. Introduction to Semantics and Pragmatics — Introduction to study of meaning in natural language. Topics: elementary set theory; propositional logic, predicate logic, and lambda calculus together with their relation to semantic analysis; model theoretic characterizations of meaning and semantic properties of English conjunctions and determiners. Grice’s theory of implicature, speech acts, Davidson’s theories of “logical form,” and Montague Grammar presented. Recommended: familiarity with elementary logic and set theory.
4 units, Win (de Swart)

230B. Semantics and Pragmatics — In-depth introduction to key areas in current research in semantics and pragmatics. Prerequisite: 230A.
4 units, Spr (Peters)
231. Topics in Semantics and Pragmatics: Theories about Focus
   4 units, Win (de Swart)

232. Topics in Discourse Analysis: Approaches to Narrative — Uses oral narrative as a site for the study of major issues and approaches in discourse analysis. Topics: the structural approach to narrative, interaction analysis approach to narrative, issues in children's development of narrative, function of narrative in social issues, e.g., the definition of the self, the negotiation of group identity, membership, and values, and the relation of individual narrative to collective forms such as folk tales, cinema, etc.
   4 units, Aut (Linde)

233. Semantics Seminar
   4 units, Spr (Staff)

235. Situation Semantics — Presents the concepts and hypotheses of situation semantics as developed by Barwise, Perry, Kratzer, and others. Applications of situation semantics to the semantics of noun phrases, conditionals, modals, and attitude verbs. Relations between this theory and other approaches to natural language semantics, including Montague grammar and Discourse Representation Theory. Prerequisite: 230A.
   4 units, Aut (Peters)

   3-4 units, Win (Winograd, Davis)

239A. Introduction to Computational Linguistics I — See 139A.
   4 units, Aut (Kay)

239B. Introduction to Computational Linguistics II — See 139B.
   4 units, Win (Kay)

240. Language Acquisition I — Survey of present knowledge of processes of language acquisition from a linguistic point of view. Recent and past literature.
   4 units, Aut (E. Clark)

241. Language Acquisition II
   1-4 units, not given 1994-95

246. Psycholinguistics — (Enroll in Psychology 214.)
   1-3 units, Spr (H. Clark)

248. Seminar on Developmental Psycholinguistics — Cross-linguistic study of acquisition, effects of input, typology, and strategies for acquisition on the learning of a first language.
   4 units, Win (E. Clark)

250. Sociolinguistic Theory and Analysis — The kinds of problems with which sociolinguists deal and the theories, models, and methods of analysis which they have developed. Emphasis is on what general linguistics might gain from the socio-linguistic approach to problems of linguistic theory and description, and linguistic change. Prerequisite: graduate standing in Linguistics or consent of instructor.
   4 units, Aut (Rickford)

251. Sociolinguistics and Pidgin-Creole Studies — 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, not given 1994-95

254. Theories and Issues in Writing and Literacy — (Enroll in Education 248.)
   4 units, Win (Sperling)

256. Topics in Linguistic Anthropology: Language and Prehistory — (Enroll in Anthropology 278.)
   5 units, Win (Fox)

   4-5 units, Win (Eckert)

260. Historical Morphology and Syntax
   4 units, Spr (Kiparsky)

262. English Transplanted, English Transformed — See 162.
   4 units, Spr (Rickford)

267. Narrative and Genre
   4-5 units, not given 1994-95

271. The Structure of Korean — (Enroll in Asian Languages/Korean 271.)
   4 units, Win (Cho)
4 units, Aut (Matsumoto)

288A, B, C. Structure of Dagaare — In-depth analysis of Dagaare, a Gur language of Ghana, covering
phonology, morphology, and syntax, with emphasis on aspects interesting from the point of view of
current linguistic theory.
288A. 2-3 units, Aut (Bodomo)
288B. 2-3 units, Win (Bodomo)
288C. 2-3 units, Spr (Bodomo)

4-5 units, Win (Hubbard)

291. The Structure of Modern Chinese — (Enroll in Asian Languages/Chinese 291.)
4 units, Spr (Sun)

395A, B. Research Workshop — Restricted to students in the doctoral program. Student presentations
of research toward qualifying papers.
395A. 2 units, Spr (Sells)
395B. 2 units, Aut (Traugott)

396. Directed Teaching
1-5 units, any quarter (Staff) by arrangement

397. Directed Reading
1-5 units, any quarter (Staff) by arrangement

1-6 units, any quarter (Staff) by arrangement

399. Dissertation Research
1-15 units, any quarter (Staff) by arrangement

REGULARLY OFFERED
BUT NOT DURING 1994-95

73. African American Vernacular English
75. Introduction to the Germanic Languages
175. Sociolinguistics and the Analysis of German
251. Sociolinguistics and Pidgin-Creole Studies
253. Language Planning and Public Policy
255. Linguistic Anthropology
258. Educational Aspects of Sociolinguistics
259. Topics in Sociolinguistics
272. Introduction to Indo-European Linguistics
282. Topics in Pragmatics: Linguistic Politeness and Conversational Logic
286. Sociolinguistic Field Methods

LANGUAGE PROGRAMS

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 1994-95 are listed
below; however, not every course listed will be taught. Additional languages may still be offered
upon request provided funding is available. Re-
quests for the 1995-96 academic year should be
made by Spring of this year at the Special Language Program office. For further information
and request forms, consult the Special Language Program, Bldg. 380, room 381A.

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 1st, 2nd, and 3rd 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 (600-619)

606A, B, C. Beginning Swahili — Successful completion of 606C may fulfill the foreign lan-
guage requirement.
606A. 4 units, Aut (Mugane)
606B. 4 units, Win (Mugane)
606C. 4 units, Spr (Mugane)

607A, B, C. Intermediate Swahili
607A. 3 units, Aut (Mugane)
607B. 3 units, Win (Mugane)
607C. 3 units, Spr (Mugane)

608A, B, C. Advanced Swahili
608A. 3 units, Aut (Mugane)
608B. 3 units, Win (Mugane)
608C. 3 units, Spr (Mugane)

610A, B, C. Structure of Dagaare — (Enroll in Lin-
guistics 288A, B, C.)
610A. 2-3 units, Aut (Bodomo)
610B. 2-3 units, Win (Bodomo)
610C. 2-3 units, Spr (Bodomo)

613A, B, C. Intermediate Wolof
613A. 3 units, Aut (Staff)
613B. 3 units, Win (Staff)
613C. 3 units, Spr (Staff)

616A, B, C. Advanced Shona
616A. 3 units, Aut (Staff)
616B. 3 units, Win (Staff)
616C. 3 units, Spr (Staff)

OTHER LANGUAGES (620-679)

620A, B, C. Beginning Arabic — Successful completion of 620C may fulfill the foreign lan-
guage requirement.
620A. 4 units, Aut (Barhoum)
620B. 4 units, Win (Barhoum)
620C. 4 units, Spr (Barhoum)

621A, B, C. Intermediate Arabic
621A. 4 units, Aut (Barhoum)
621B. 4 units, Win (Barhoum)
621C. 4 units, Spr (Barhoum)
### 622A,B,C. Advanced Arabic
- **622A.** 4 units, Aut (Barhoum)
- **622B.** 4 units, Win (Barhoum)
- **622C.** 4 units, Spr (Barhoum)

### 625A,B,C. Topics in Arabic Literature and Culture
- **625A.** Influences and Issues in Contemporary Arabic Literature — Introduction to key forms of modern Arabic literature. Survey of different genres (i.e., poetry, novels, essays, short stories) providing a glimpse at Arab society and culture. Readings include literary works dealing with such dominant cultural topics as nationalism, religion, gender and women issues, kinship and social concepts. DR:2t or 7t(2)
  - 4 units, Aut (Barhoum)
- **625B.** Contemporary Arab Writers — Samples of contemporary writings by influential Arab authors. Analysis of creative and cultural factors shaping the literary conceptions and works of each writer. Emphasis on texts that accentuate cultural and historical turning points in the collective experience of the modern Arab world. DR:2t or 7t(2)
  - 4 units, Win (Barhoum)
- **625C.** The Arab World through Travel Literature — Early colonialist and post-colonialist portrayals of Arab culture in the West. Recent critical examinations of such stereotypical depictions of Arabs and Islam. DR:2t or 7t(2)
  - 4 units, Spr (Barhoum)

### 626A,B,C. Beginning Turkish
- **626A.** 3 units, Aut (Ayanoglu)
- **626B.** 3 units, Win (Ayanoglu)
- **626C.** 3 units, Spr (Ayanoglu)

### 628A,B,C. Beginning Hebrew
- **628A.** 4 units, Aut (Berman)
- **628B.** 4 units, Win (Berman)
- **628C.** 4 units, Spr (Berman)

### 630A,B,C. Advanced Hebrew
- **630A.** 4 units, Aut (Berman)
- **630B.** 4 units, Win (Berman)
- **630C.** 4 units, Spr (Berman)

### 637A,B,C. Beginning Siouan/Lakota
- **637A.** 3 units, Aut (Fast Wolf)
- **637B.** 3 units, Win (Fast Wolf)
- **637C.** 3 units, Spr (Fast Wolf)

### 650A,B,C. Beginning Vietnamese
- **650A.** 3 units, Aut (Ha)
- **650B.** 3 units, Win (Ha)
- **650C.** 3 units, Spr (Ha)

### 652A,B,C. Beginning Hindi
- **652A.** 3 units, Aut (Singh)
- **652B.** 3 units, Win (Singh)
- **652C.** 3 units, Spr (Singh)

### 655A,B,C. Beginning Bengali
- **655A.** 3 units, Aut (Staff)
- **655B.** 3 units, Win (Staff)
- **655C.** 3 units, Spr (Staff)

### 656A,B,C. Beginning Indonesian
- **656A.** 3 units, Win (Burke)
- **656B.** 3 units, Spr (Burke)

### 659A,B,C. Beginning Punjabi
- **659A.** 3 units, Aut (Dhillon)
- **659B.** 3 units, Win (Dhillon)
- **659C.** 3 units, Spr (Dhillon)

### 660A,B,C. Beginning Sanskrit
- **660A.** 3 units, Aut (Wallace)
- **660B.** 3 units, Win (Wallace)
- **660C.** 3 units, Spr (Wallace)

### 670A,B,C. Beginning Modern Greek
- **670A.** 4 units, Aut (Prionas)
- **670B.** 4 units, Win (Prionas)
- **670C.** 4 units, Spr (Prionas)

### 671A,B,C. Intermediate Modern Greek
- **671A.** 3 units, Aut (Prionas)
- **671B.** 3 units, Win (Prionas)
- **671C.** 3 units, Spr (Prionas)

### 674A,B,C. Beginning Quechua
- **674A.** 3 units, (Staff)
- **674B.** 3 units, (Staff)
- **674C.** 3 units, (Staff)

### 678A,B,C. Beginning Sign (ASL)
- **678A.** 3 units, Aut (Haas)
- **678B.** 3 units, Win (Haas)
- **678C.** 3 units, Spr (Haas)

### 679A,B,C. Intermediate Sign (ASL)
- **679A.** 3 units, Aut (Haas)
- **679B.** 3 units, Win (Haas)
- **679C.** 3 units, Spr (Haas)

### ENGLISH FOR FOREIGN STUDENTS (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 EPS office in Building 380, room 381A, the first day of each quarter.

During the Summer Session, courses in spoken and written English are offered. A six-week intensive course in English and academic orientation for graduate students is also offered during the summer. These programs are open to qualified students who have been admitted to degree programs at other U.S. institutions, as well as those who have been admitted to Stanford for the following Autumn Quarter. Summer students must apply directly to the program coordinator.

690. Interacting in English — Structured practice in spoken English with emphasis on current use in daily situations. Focus is on informal language used by educated speakers.
   3 units, Aut, Spr (Staff) by arrangement

691A. Academic Discussion — Practice in seminar-style discussions as active participants and leader. Emphasis on fluency and comprehensibility; feedback from instructor on language and effectiveness.
   3 units, Aut, Win, Spr (Rylance, Staff) by arrangement

691B. Making Oral Presentations in English — Preparation and delivery of numerous oral presentations, followed by short discussions. Emphasis on appropriate language and style in university settings. Video and other feedback from instructor.
   3 units, Aut, Win, Spr (Staff) by arrangement

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. Methods of feedback include videotaping and self and staff evaluations.
   1 unit, Aut, Spr (Hubbard, McChesney) by arrangement

693. Aural Comprehension — Practice in listening to lectures, and discussion with evaluation of comprehension. Strategies for improving understanding and retention. Prerequisite: consent of instructor.
   3 units, Aut (Staff) by arrangement

694. Interpreting English — For advanced graduate students. Analysis of intended and hidden messages in speaking and writing, using sources from academia and the mass media. Focus is on how people use language to inform, persuade, and comment. Prerequisite: consent of instructor.
   3 units, Spr (Hubbard) by arrangement

695. Special Topics in English — Topics such as pronunciation and intonation, grammar, or intercultural communication determined each quarter according to enrollment.
   1-3 units, Aut, Win, Spr (Mawson, Staff) by arrangement

698A. Writing Academic English — Prepares graduate students for writing academic papers; emphasis on fluency, organization, documentation, and appropriateness for specific tasks. Prerequisite: consent of instructor.
   3 units, Aut, Win, Spr (McChesney, Staff) by arrangement

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) by arrangement

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. Consult the department listings for further information.

ASIAN LANGUAGES

GENERAL
131. Chinese Poetry in Translation
132. Chinese Fiction and Drama in Translation
133. Modern Chinese Literature in Translation
135. Japanese Drama in Translation
138. Modern Japanese Literature in Translation
182. Chinese Lyric Aesthetics

CLASSICS
12. Greek Tragedy — (Same as Drama 53.)

FRENCH AND ITALIAN

GENERAL
206E. The Grail Legend in Modern Culture
208E. Female Saints
214E. Imagine the Afterlife
233E. Dante’s Divine Comedy
572 SCHOOL OF HUMANITIES AND SCIENCES

247E. Rousseau
248E. Machiavelli
249E. Introduction to Hegel: Kojève and the End of History
251E. F. T. Marinetti and Futurism(s)
256E. Social Reality and Individual Survival from Proust to Camus
258E. The Intellectual as Writer: Jean-Paul Sartre
270E. European Fiction: Myth and Religion
273E. Women and Psychoanalysis
274E. Political Theory and Mimetic Desire
278E. French Democracy vs. British Liberalism
291E. Sports and Culture
292E. Mimesis in Literature and Theory
294E. The Renaissance and Early Modern Traditions
295E. Paradigms of Modern Thought: Michel Foucault and the Archeology of Knowledge
296E. France in the Occupation: A Site of Memory and Controversy
348E. Stendhal
349E. Seminar: Narratology — Myth, Fiction, and History
377E. Limits of Economic Rationality: The Nature of the Social Bond
384E. Poststructuralism and its Discontents

GERMAN STUDIES
7A,8A,9A. Myth and Modernity
7A. Literature
8A. Logos
9A. Language
31A-33A. German Culture and Civilization I-III
175A. From Gutenberg to Volkswagen: Technology and Culture in Germany — (Same as History and Philosophy of Science 148.)
246A. German Dramas of Revolution and Theories of Revolution
293A. Gendered Perspectives: Literature, Criticism, Theory
333A. Seminar in European Romantic Drama

HUMANITIES
SPECIAL PROGRAMS
311,312,313,314,315. Graduate Program in Humanities Seminars — Open to graduate students only, and require consent of the instructor.

311. Classical Seminar
312. Medieval Seminar — (Same as Art 312.)
313. Early Modern Seminar
314. Modern Seminar
315. Graduate Core Colloquium: The Interdisciplinary Study of the Humanities

SLAVIC LANGUAGES AND LITERATURES
145/245. The Age of Experiment (1820-1864)
146/246. Struggles with Authority in the Russian Novel, 1861-1922
147/247. State and Revolution: Russian Literature in the 20th Century
151. Dostoevsky
155/255. Transitions: Chekhov, the Modern Short Story, and Modern Drama
156. Nabokov and Modernism
157. Memory, Mind, and the Body in the Works of Milan Kundera
161/261. Poetics: The Grammar of the Self When the Poet Is a Woman
190. Modernism and the Humanities: Tolstoy's Anna Karenina and the Social Thought of Its Time

SPANISH AND PORTUGUESE
SPANISH
178. Fiction and Political Imagination: Latin American Novels in Translation
216. Don Quijote I
217. Don Quijote II
318. Don Quijote

PORTUGUESE
184. Lusophone African Oral Literature
190. Masterpieces of Portuguese Literature in Translation

MATHEMATICAL AND COMPUTATIONAL SCIENCE

Committee in Charge: (Chair) Bradley Efron (Statistics); Robert W. Floyd (Computer Science, emeritus) Don Iglehart (Operations Research), Joseph B. Keller (Mathematics, emeritus), Robert Osserman (Mathematics), Eric S. Roberts (Computer Science), David Siegmund, Mary V. Sunseri (Mathematics, emerita)
Ex-officio Members: Takeshi Amemiya (Economics), Thomas M. Cover (Electrical Engineer-
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, 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 or Math. 19, 20, 21, 43</td>
<td>15</td>
</tr>
<tr>
<td>Math. 44. Calculus</td>
<td>3</td>
</tr>
<tr>
<td>Math. 103. Matrix Theory and Its Applications or Math. 113. Linear Algebra and Matrix Theory</td>
<td>3</td>
</tr>
<tr>
<td>Math. 104. Continuation of 103 or Math. 114. Continuation of 113</td>
<td>3</td>
</tr>
<tr>
<td>Math. 109. Modern Algebra and its Applications 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: Math. 115. Fundamental Concepts of Analysis or Math. 160A. First Order Logic</td>
<td>4</td>
</tr>
<tr>
<td>Computer Science 137. Fundamentals of Numerical Computation</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) (CS 106A and B may be substituted)</td>
<td>5</td>
</tr>
<tr>
<td>2. CS 109A/B. Introduction to Computer Science</td>
<td>8</td>
</tr>
<tr>
<td>3. One of the following: 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 154. Introduction to Automata and Complexity Theory or CS 254. Automata, Languages, and Computability</td>
<td>4</td>
</tr>
<tr>
<td>CS 260. Concrete Mathematics</td>
<td>3</td>
</tr>
<tr>
<td><strong>Operations Research (OR) (8-9 units)</strong></td>
<td></td>
</tr>
<tr>
<td>OR 152. Introduction to Operations Research I (Enroll in Engineering 62)</td>
<td>4</td>
</tr>
<tr>
<td>OR 153. Introduction to Operations Research II or OR 241. Linear Programming or OR 340. Linear Programming</td>
<td>3</td>
</tr>
<tr>
<td>OR 243. Integer and Nonlinear Programming</td>
<td>3</td>
</tr>
<tr>
<td>OR 251. Stochastic Decision Models in Operations Research</td>
<td>3</td>
</tr>
<tr>
<td><strong>Statistics (10 units)</strong></td>
<td></td>
</tr>
<tr>
<td>Stat. 200. Introduction to Statistical Inference</td>
<td>3</td>
</tr>
<tr>
<td><strong>Electives (9 units)</strong></td>
<td></td>
</tr>
<tr>
<td>Three courses in mathematical and computational science, 100-level or above, and at least 3 units each. At least one must be chosen from the following list: 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: CS 110. Introduction to Computer Systems and Assembly Language Programming</td>
<td>3</td>
</tr>
<tr>
<td>CS 112. Computer Organization and Design (Enroll in Elect. Engr. 182)</td>
<td>3</td>
</tr>
<tr>
<td>CS 140. Concurrent Programming</td>
<td>3</td>
</tr>
<tr>
<td>CS 143. Compilers</td>
<td>3</td>
</tr>
<tr>
<td>CS 157. Logic and Automated Reasoning</td>
<td>3</td>
</tr>
<tr>
<td>CS 161. Data Structures and Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 211. Logic Design (Enroll in Elect. Engr. 381)</td>
<td>3</td>
</tr>
<tr>
<td>CS 212. Computer Architecture and Organization (Enroll in Elect. Engr. 282)</td>
<td>3</td>
</tr>
<tr>
<td>CS 221. Introduction to Artificial Intelligence</td>
<td>3</td>
</tr>
<tr>
<td>CS 237A. Numerical Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>CS 240A. Operating Systems and Systems Programming</td>
<td>3</td>
</tr>
<tr>
<td>CS 243. Advanced Compiling Techniques</td>
<td>3</td>
</tr>
</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, etc., 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 letter grade indicator (LGI) of 'C' or better in all course work used to fulfill the major requirement.

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, an average LGI 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
   (c) 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

Emeriti: (Professors) Kai Lai Chung, Robert Finn, David Gilbarg, Samuel Karlin, Joseph Keller, Georg Kreisel, Harold Levine, Ralph Phillips, Hans Samelson, Menahem Schiffer, Mary Sunseri

Chair: Ralph Cohen


Associate Professors: Daniel Bump, Rafe Mazzeo, Brad Osgood

Assistant Professors: Benjamin Andrews, Amir Dembo, Andrew Hassel, Ron Karidi, Nadine Kowalsky, Rachel Kuske, Jun Li, Antonia Melas, Paul Milewski, Constantine Teleman, Jaiping Wang, Bo Zhang

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 program 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 FRESHMAN

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. For referral to an adviser on advanced placement, communicate with the academic secretary of the department.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

The following departmental requirements are in addition to the University's basic requirements for the bachelor's degree.

1. Calculus and Analytic Geometry (courses 19, 20, 21, 43, 44; or 41, 42, 43, 44). These courses should be started during the first year.
2. Ten 3-unit courses, numbered 100 or above or 44H, 45H (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 — 44H, 45H, 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 letter grade indicator (LGI) 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, and Russian.

4. One of the following options. The choice of 'a' or 'b' is recommended.
   a) Physics 51, 53, 55, 57 (total 15 units) or 61, 62, 63 (total 12 units).
   b) Any four quarters of physics lecture courses numbered 51 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.

* The new algebra requirement for mathematics majors applies to students who declared a Mathematics major Autumn Quarter 1991 and thereafter.

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.

HONORS PROGRAM

The Department of Mathematics program leading to the degree of B.S. in Mathematics with Honors is intended for students having 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. 45H 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). In addition, 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>Autumn</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>43H</td>
<td>44H</td>
<td>45H</td>
</tr>
<tr>
<td>120</td>
<td>134A</td>
<td>134B</td>
</tr>
<tr>
<td>171</td>
<td>173</td>
<td>114</td>
</tr>
<tr>
<td>143</td>
<td>4 electives</td>
<td></td>
</tr>
<tr>
<td>206</td>
<td></td>
<td>from the 140s and 150s</td>
</tr>
<tr>
<td>205A</td>
<td>205B</td>
<td>205C</td>
</tr>
<tr>
<td></td>
<td>Senior Thesis</td>
<td></td>
</tr>
</tbody>
</table>

Students with questions about the honors program should see Professor Osgood.

BACHELOR OF SCIENCE IN MATHEMATICAL AND COMPUTATIONAL SCIENCE

The Department of Mathematics participates with the Departments of Computer Science, 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 “Advanced 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 an average letter grade indicator (LGI) of ‘B’ over all course work taken in Mathematics, and an LGI 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.

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.

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 18 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

INTRODUCTORY AND UNDERGRADUATE

The department offers two sequences of introductory courses in calculus.

1. Calculus and Analytic Geometry (41, 42, 43) presents one-variable calculus and plane analytic geometry in the first two quarters (41, 42), and multi-variable differential calculus in the third quarter (43).

2. Calculus and Analytic Geometry (19, 20, 21) covers the material of 41 and 42 in three quarters instead of two.

The introductory course in modern algebra is Linear Algebra (103 or 113). There are no for-
mal prerequisites for this course, but appropriate mathematical maturity is expected.

19, 20, 21. Calculus — The content is the same as the sequence 41 and 42 described below, over three quarters rather than two.

19. Calculus — DR: 4(6)
   3 units, Aut (Brumfiel)
   lecture TTh 11 or 1:15, section W 10, 11, 1:15, 2:15, or 3:15
   Win (Staff) MWF 9, 10
   Sum (Staff) MTWTh 10

   3 units, Win (T. P. Liu)
   lecture TTh 11 or 1:15, section W 10, 11, 1:15, 2:15, or 3:15
   Spr (Staff) MWF 9, 10

   4 units, Spr (Kuske) lecture TTh 11 or 1:15
   section W 10, 11, 1:15, 2:15, or 3:15

41, 42, 43 — Three large lecture classes per week plus two classes in small sections.

41. 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. More conceptual (and more applied) than traditional courses and emphasizes a numerical, graphical, and analytical approach to the subject. Prerequisite: algebra and trigonometry. DR: 4(6)
   5 units, Aut (Carlsson) MTWThF 11 or 1:15
   Win (Andrews) MTWThF 11 or 1:15
   Spr (Hassell) MTWThF 11 or 1:15

42. Calculus — Continuation of 41. Methods of symbolic and numerical integration, applications of the definite integral, introduction to differential equations. Prerequisite: 41 or equivalent. DR: 4(6)
   5 units, Aut (Milewski)
   MTWThF 11 or 1:15
   Win (Andrews) MTWThF 11 or 1:15
   Spr (Osserman) TTh 11-12:15

43. Calculus — Continuation of 42. Vector functions, functions of several variables, partial derivatives, gradient, Lagrange multipliers, double and triple integrals. Prerequisite: 42 or consent of department. DR: 4(6)
   5 units, Aut (Osgood)
   MTWThF 11 or 1:15
   Win (Mazzeo)
   MTWThF 11 or 1:15
   Spr (White) MTWThF 11 or 1:15

43H, 44H, 45H. Honors Calculus — 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, 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. 43H satisfies DR: 4(6)
   5 units, Aut (Kerckhoff) MTWTh 2:15-3:15
   Win (Eliashberg) MTWTh 2:15-3:15
   Spr (Hassell) MTWTh 2:15-3:15

44. Calculus — Continuation of 43. Line and surface integrals. The basic theorems of vector analysis (Green’s, Stokes, and Divergence). Prerequisite: 43 or equivalent.
   3 units, Aut (Rade) MWF 1:15
   Win (Osgood) MWF 1:15
   Spr (Teleman) MWF 1:15

53. The Nature of Mathematics — (Enroll in Science, Technology, and Society 53.) Introduction to the history, methods, results, and application of mathematics. Topics: from geometry and calculus to the structure of the universe; the potentialities and limitations of computation; topology, knots, and DNA; symmetry in mathematics, art, and nature; uses and misuses of statistics; logic and the philosophy of mathematics.
   3 units, Aut (Feferman) TTh 11-12:15

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. DR: 4(6)
   3 units, Aut (Gaberstein, Karidi)
   MWF 10 or TTh 11-12:15
   Win (Zhang, Hillman) MWF 10 or TTh 1:15-2:30
   Spr (Osserman) TTh 11-12:15
   Sum (Staff) MTWTh F 11

   3 units, Win (Wang) TTh 11-12:15
   Spr (Osserman) TTh 11-12:15
   Sum (Staff) MTWTh 9
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.
3 units, Aut (Zhang) TTh 9-10:15
Spr (Osserman) TTh 1:15-2:30
Sum (Staff) MTWTh 9

109. Modern Algebra and its Applications — Same as 120, but emphasis on applications of modern algebra including symmetry groups, crystallographic groups, and error-correcting codes. Prerequisite: 103, 113, or equivalent.
3 units, Aut (Kerckhoff) MW 11-12:15

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; diagonal and Jordan forms.
3 units, Aut (Teleman) MWF 10
Win (Venkor) MW 10

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; Hermitian and unitary matrices; multilinear algebra.
3 units, Win (Teleman) MWF 10

3 units, Aut (Wang) TTh 11-12:15
Win (Feferman) TTh 11-12:15
Sum (Staff) MTWTh 11

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.
3 units, Aut (T. P. Liu) TTh 11-12:15

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 (Karidi) TTh 1:15-2:30

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 1994-95

130. Ordinary Differential Equations — Special equations, exact equations, linear equations; series solutions, numerical solution; Laplace transform; systems of equations. Prerequisite: 44, concurrent registration in 44, or consent of instructor.
3 units, Aut (Hassell, Wang) MWF 2:15
or TTh 1:15-2:30
Win (Schoen, Simon) MWF 2:15
or TTh 1:15-2:30
Spr (Zhang, Brendel) MWF 2:15 or TTh 1:15-2:30
Sum (Staff) MTWTh 1:15

131. Partial Differential Equations I — First order equations, classification of second order equations. Initial-boundary value problems for heat equation, wave equation, and related equations. Separation of variables, eigenvalue problems, Fourier series, existence and uniqueness questions. Prerequisite: 130 or equivalent.
3 units, Win (T. P. Liu) TTh 1:15-2:30
Spr (Schoen) TTh 1:15-2:30

3 units, Spr (Zhang) MWF 2:15

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: 45H, or 113 and 130, or 171, or consent of instructor.
3 units, Win, Spr (Ginzburg) MWF 2:15

141. Higher Geometries — Study of various geometries, including projective, affine, and non-Euclidean geometry. Prerequisite: 113.
not given 1994-95

3 units, Aut (Eliashberg) TTh 1:15-2:30
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. not given 1994-95

147. Differential Topology — Smooth manifolds, transversality, Sard’s theorem, embeddings, degree of a map, Borsuk-Ulsem theorem, Hopf degree theorem, Jordan Curve Theorem. Prerequisites: 115 or 171, 173. not given 1994-95

148. Algebraic Topology — Fundamental group, covering spaces, Euler characteristic, classification of surfaces, knots. Prerequisites: 120, 171.

3 units, Spr (Burns) MWF 1:15

150. Introduction to Combinatorial Theory — (Enroll in Computer Science 264.)

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 (Karidi) TTh 1:15-2:30

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, Win (P. Cohen) TTh 1:15-2:30

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 1994-95

156. Group Representations not given 1994-95

160A. First-Order Logic — (Enroll in Philosophy 160A.)

4 units, Win (Kremer)

160B. Computability and Logic — (Enroll in Philosophy 160B.)

4 units, Spr (Mints)


3 units, Spr (Ratner) TTh 3:15-4:30

162. Philosophy of Mathematics — (Enroll in Philosophy 162.)

not given 1994-95

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: 43H, 44H, 45H, or equivalent.

3 units, Aut (Simon) TTh 9-10:30


3 units, Win (Burns) MWF 1:15

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.

not given 1994-95

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 developed 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 1994-95

181. Topics in the History of Mathematics: From Antiquity to the 17th Century — (Enroll in History 138D, History and Philosophy of Science 140, Philosophy 140.)
PRIMARILY FOR
GRADUATE STUDENTS

200. Graduate Problem Seminar
not given 1994-95

205A. Theory of Functions of a Real Variable—Lebesgue measure and integration, LP spaces and convergence theorems. Prerequisite: 171 or equivalent.
3 units, Aut (Papanicolaou) MWF 10
Spr (Ratner) TTh 3:15-4:30

3 units, Win, Spr (Papanicolaou, Wang) MWF 10

206A. Theory of Functions of Complex Variable—Complex integration. Cauchy’s theorem, Residue theorem, argument principle, power series, conformal mapping. Prerequisite: 171.
3 units, Aut (Katznelson) MWF 11

206B. Theory of Functions of Complex Variable—Riemann mapping theorem, product develop- ments, entire functions, elliptic functions, Dirichlet problem, Picard’s theorem. Prerequisites: 171, 206A.
3 units, Win (Katznelson) MWF 11

210A. Modern Algebra—Groups, rings and fields, Galois theory, ideal theory. Prerequisite: 120 or equivalent.
3 units, Aut (P. Cohen) TTh 11-12:15

210B,C. Modern Algebra—Introduction to algebraic geometry representation of groups and rings, multilinear algebra. Prerequisites: 120 or equivalent, 206A.
3 units, Win (Brumfiel) TTh 11-12:15

3 units, Win, Spr (Schoen) TTh 2:15-3:30


220A. 3 units, Aut (Hassell) TTh 9:30-10:45
220B. 3 units, Win (Kuske) TTh 9:30-10:45
220C. 3 units, Spr (B. Zhang) TTh 9:30-10:45

221A. Calculus of Variations—Euler-Lagrange equations, sufficient conditions; applications to eigenvalue and scattering problems; direct methods, Dirichlet’s principle.
not given 1994-95

224. Integral Equations
not given 1994-95

228A. Introduction to Ergodic Theory—Measure preserving transformations and flows, ergodic theorems, mixing properties, spectrum, Kolmogorov automorphisms, entropy theory. Examples. Prerequisites: 205A, 205B.
3 units, Win (Ratner) TTh 1:15-2:30

228B. Introduction to Ergodic Theory—Classical dynamical systems, mostly geodesic and horocycle forms on homogeneous spaces of SL (2,R). Prerequisites: 205A, 205B.
3 units, Spr (Ratner) TTh 1:15-2:30

not given 1994-95

not given 1994-95

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.
not given 1994-95

235A,B,C. 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, Spr (Ornstein)
3 units, Win (Papanicolaou)

3 units, Spr (Papanicolaou)

242. Difference Equations — not given 1994-95

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, Spr (Osgood)

not given 1994-95

3 units, Aut (Eliashberg)

248A,B. Analytic Number Theory — The theory of modular forms.
not given 1994-95

252A. Matrix Theory and Inequalities — not given 1994-95

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 1994-95

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.
3 units, Aut, Win (Katznelson, Ornstein)

3 units, Aut (Simon)

3 units, Win, Spr (Simon, Andrews)

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.
not given 1994-95

not given 1994-95

3 units, Win, Spr (P. Cohen)

Perturbation theory. Geometric optic and contact geometry.

not given 1994-95


not given 1994-95


not given 1994-95

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 syntheses, thin sets, spectral theory of convolution operators, and applications. Prerequisite: knowledge of the elements of Fourier analysis.

not given 1994-95

272A,B. Topics in Partial Differential Equations

not given 1994-95

274. Wave Propagation — (Same as Mechanical Engineering 236.) Basic concept, waves, wavefronts, rays, phase functions, amplitude functions, ray equations, eikonal equations, transport equations, reflection coefficients, transmission coefficients, edge diffraction coefficients, surface diffraction coefficients, asymptotic expansions, wave equations. Applications to electromagnetic, acoustic, elastic, and other types of waves.

3 units, Aut (Keller) TTh 9:30-10:45

276A. Dynamical Systems — (Enroll in Mechanical Engineering 233A.)

3 units, Win (Stuart) TTh 9:30-10:45

276B. Numerical Analysis of Dynamical Systems — (Enroll in Mechanical Engineering 233B.)

3 units, Spr (Staff) TTh 9:30-10:45

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 1994-95

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 (R. Cohen) MWF 1:15

Win (Teleman) MWF 1:15

283. Topics in Topology

not given 1994-95

285A. Geometric Measure Theory — Hausdorff measures and dimensions, area and coarea formulas for Lipschitz maps, integral currents and flat chains, minimal surfaces and their singular sets.

not given 1994-95

290A. Model Theory — Language and models of the first order predicate calculus.Validity and definability. Complete and decidable theories. Saturated models, ultraproducts, categoricity in power. Infinitary languages. Applications to algebra. Prerequisites: 160A,B and 162, or equivalent.

3 units, Win, Spr (Feferman) TTh 2:15-3:30


not given 1994-95

292A,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 equivalent.

not given 1994-95

293 A,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 equivalent.

not given 1994-95

294. Topics in Logic — Normalization of finite objects using infinite expansions. Extraction of information from proofs often uses normal forms obtained by a series of reduction steps, e.g., realization of probable existential formulas, normalization of natural deductions in the predicate logic and arithmetic. Infinite expansions of finite objects can be used to estimate the rate of convergence (termination) of the reduction process and investigate properties of the objects. Topics: normalization (cut-elimination) in the first-order arithmetic with omega-rule, primitive recursive cut-elimination, preservation of the additional structure, and stability of
program extraction (E-theorems). Prerequisites: 160B and 290, or equivalent.
3 units, Spr (Mints)

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 1994-95

350. Directed Reading
any quarter (Staff) by arrangement

351. Seminar Participation — Participation in a student-organized graduate seminar under the general supervision of a faculty member.
any quarter (Staff) by arrangement

360. Advanced Reading and Research
any quarter (Staff) by arrangement

361. Seminar Participation — Participation in a faculty-led seminar which has no specific course number.
any quarter (Staff) by arrangement

380. 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

Committee in Charge: (Chair) Hester Gelber; Theodore Andersson, Seth Lerer, William Mahrt, Laura Smoller
Affiliated Faculty: Theodore M. Andersson (German Studies), George H. Brown (English) on leave 1994-95, Philippe Buc (History) on leave Winter, Spring 1994-95, Brigitte Cazelles (French and Italian), Hester Gelber (Religious Studies), Seth Lerer (English), Suzanne Lewis (Art), William Mahrt (Music), Jeffrey Schnapp (French and Italian, and Comparative Literature), Laura Smoller (History)

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 advisor 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 chosen from the above list.
5. One course in a third category chosen 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.

**COURSES**

165. Introduction to Medieval Culture — (Same as English 165A.) 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. DR:7(2) or 8(3)
5 units, Spr (Andersson, Staff)

**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**
107. Age of Cathedrals
108. Age of Realism: 15th-Century French and Netherlandish Painting
206A. Seminar: Manuscript Illuminated

**ENGLISH**
165B. Arthurian Literature
171A. Chaucer’s Canterbury Tales
171C. The Gawain/Pearl Poet
181. Seminar: The Other Middle Ages
211. Readings in Middle English
270. Beowulf
312. Seminar: Medieval Drama

**FRENCH**
130. Middle Ages and Renaissance France
206E. The Grail Legend in Modern Culture

**GERMAN STUDIES**
251. Introduction to the Runes
253. History of the German Language
254. Old Saxon
261. Carolingian Literature
371. Old Norse Poetry

**HISTORY**
14S. Introductory Seminar: Apocalypse Now — and Then: Apocalyptic Thought in Medieval Europe
111. The Black Death and Medieval Responses to Plague: The AIDS of the 14th Century
188B. Jews in the Medieval World
194A. Early and Medieval Japan to 1500
194B. History of Japan, 15th-19th Century
211. Undergraduate Colloquium: Body, Gender, and Society in Medieval Europe
212. Undergraduate Colloquium: Homosexuals, Heretics, Witches, and Werewolves: Deviants in Medieval Society
214. Undergraduate Colloquium: Magic, Science, and the Occult in Medieval and Renaissance Europe
299. Undergraduate Colloquium: The Institutions of Medieval Japan
395A. Graduate Colloquium: Early and Medieval Japan
395B. Graduate Colloquium: Late Medieval and Early Modern Japan

**HUMANITIES**
312. Medieval Seminar

**ITALIAN**
128. Italian Studies II: The Middle Ages and the Renaissance

**POLITICAL SCIENCE**
151A. History of Political Thought I: Ancient, Classical, and Christian Worlds

**RELIGIOUS STUDIES**
172. Sex, Body, and Gender in Medieval Religion

234. Virgin Mary and Images of Power

**SPANISH**
150. Spanish Literature I

**MODERN THOUGHT AND LITERATURE**

Chair: Regenia Gagnier (English)
Committee in Charge: Joel Beinin (History), Russell A. Berman (German Studies), Jane Collier (Anthropology, on leave 1994-95), John Dupré (Philosophy), Regenia Gagnier (English), Theodore L. Glasser (Communication), Akhil Gupta (Anthropology), Elizabeth Hansot
The Program in Modern Thought and Literature is administered through the office of Humanities Special Programs. The program admits students for the Ph.D. and sponsors an undergraduate major through the Humanities honors program.

**UNDERGRADUATE PROGRAM**

**HONORS PROGRAM**

This undergraduate program is designed for students with a strong commitment to the interdisciplinary study of modern literature (since the 18th century), intellectual 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 fourth 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 departmental major in order to be able to graduate, should the honors essay not be completed in acceptable form. 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. Six courses in a single literature, read in the original language, and covering a wide range of periods and genres.
5. Three courses, to be chosen in consultation with the adviser, covering major movements in intellectual history since the Enlightenment.
6. One course in the history or philosophy of modern science or technology or its impact on modern culture.
7. One course in modern art or music.
8. One course in history or social science addressing modernization or modernity.
9. Completion of at least two years of college-level study of a modern foreign language or demonstration of equivalent proficiency.
10. Honors essay written from an interdisciplinary perspective (2 units, Spring Quarter, junior year; 5 units, Autumn Quarter; 5 units, Winter Quarter, senior year). A letter grade indicator (LGI) of at least 'B' is required on the essay for graduation with honors in Humanities.

*Note* — With the consent of the adviser, courses on cultural studies may be used to satisfy some part of requirements 4-8.

**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 15.

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 the Graduate Degree Progress Section of 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. 20 units of advanced course work in literature, to be approved by the chair;
3. 20 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 Master of Arts degree. Candidates for the Ph.D. who satisfy the committee of their progress, and who 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:

2. Nine courses of advanced work in literary studies in one language, usually English. (Literature in another language taught at Stanford may be substituted.) 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), teaching praxis (399) 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 comprising a coherent program. This component must be worked out individually with the student's adviser. Of these eight courses, at least six must be regularly scheduled substantive courses, of which at least one must be a regularly scheduled seminar. 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 non-literary studies.

HUMANITIES

The committee 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 history under History. If the area of non-literary interest is thematic rather than disciplinary, doctoral students should look under various program listings, such as Feminist Studies, African and Afro-American Studies, or Chicano Fellows.

140B. Women in the Health Care Debate — (Enroll in Feminist Studies 140B.) See description under Feminist Studies.

5 units, Aut (Gillespie)

140C. Gender and Class — (Enroll in Feminist Studies 140C.) See description under Feminist Studies.

5 units, Aut (Joseph)

175. Individual Work—Directed reading or research for undergraduates. Individual work does not count towards unit requirements for undergraduate Humanities major with a concentration in Modern Thought and Literature. Prerequisite: consent of instructor.

2-5 units, any quarter (Staff)

213. Family Dynamics in Literature — 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)

361. The Modern Tradition: Modernity and Its Critics — (Enroll in English 361). Required of all graduate students in Modern Thought and Literature. Aspects of modernity via the work of its critics. Social and cultural theorists developed critical methods and analytical vocabularies to understand the material and ideological apparatuses of different social formations focusing on transitions and overlaps between the early modern/modern/post-modern. Key texts in social and cultural theory (some in literary theory) provide a working sense of these debates and issues.

5 units, Aut (Kaul)

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, by arrangement

396L. Laboratory in Pedagogy—(Enroll in English 396L.) Required for graduate students planning to TA in English courses. Intensive focus on
grading of papers and developing skills for leading discussions and working as a Course Assistant.

2 units, Aut (Fields, Reichard)

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 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. Class 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.

5 units, Aut (Fields, Staff)

397B. Teachers Workshop II — (Enroll in English 397B.) Seminar for second-year graduate students teaching the first quarter of composition, focusing on the syllabus. Students share assignments, problems, and solutions they have encountered in their teaching.

5 units, Win (Fields, Staff)

397C. Teaching Workshop III — (Enroll in English 397C.) See 397B.

5 units, Spr (Fields, Staff)

398. Research Courses — Student pursues 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, by arrangement

399. Teaching Praxis — Open to Ph.D. students in Modern Thought and Literature who are teaching but not on Teaching Assistantships.

3-5 units, any quarter, by arrangement

AFFILIATED DEPARTMENT OFFERINGS

The following courses, offered in 1994-95 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 Courses, Degrees, and Information.

ANTHROPOLOGY

251B. Cultural Citizenship
(Rosaldo)

291. History of Anthropology: The 20th Century
(Gupta, Fujimura)

COMMUNICATION

233. Communication and Culture
(Glasser)

331G. Seminar in Media Ethics and Responsibility
(Glasser)

ENGLISH

163B. Cultural Studies of the City
(Gagnier)

163H. Contemporary Issues in Feminist Theory
(Gagnier)

252. Colloquium: British Poetry in the Later 18th Century
(Kaul)

296. Critical Theory and the Profession: An Introduction to Graduate Study
(Kaul)

HISTORY

344A. Graduate Colloquium: Problems in Modern British Society
(Stansky)

386. Graduate Colloquium: Economic and Social History of the Modern Middle East
(Beinin)

388. Graduate Colloquium: Palestine and the Arab-Israeli Conflict
(Beinin)

445. Graduate Seminar: Research—Modern Britain
(Stansky)

POLITICAL SCIENCE

153. Utopian Political Thought
(Hansot)

MUSIC

Emeriti: (Professors) William L. Crosten, George Houle, Wolfgang E. Kuhn, Herbert B. Nanney, William H. Ramsey, Leonard G. Ratner, Sandor Salgo, Earl Schubert (by courtesy, School of Medicine), Leland C. Smith; (Professors, Performance) Arthur P. Barnes (on leave Spring), Marie Gibson, Andor Toth; (Senior Lecturer) Naomi Sparrow; (Lecturers) Frances Blaisdell, Earle Blew, Edward C. Colby
Chair: Christopher Chafe
Professors: Karol Berger, John Chowning, Albert Cohen (on leave Spring)
Associate Professors: Christopher Chafe, Stephen Hinton, William P. Mahrt, Julius O. Smith
Assistant Professors: Thomas Grey (on leave Spring), Melissa M. S. Hui, Jody Rockmaker
Professor (Research): Max V. Matthews  
Associate Professor (Performance): George Barth  
Senior Lecturers: Judith Bettina (Voice, on leave), Susan Freier* (Violin), Stephen Harrison* (Violoncello), Gennady Kleyman (Violin, Viola), Phillip Levy* (Violin), Benjamin Simon* (Viola), Gregory A. Wait (Voice), Frederick R. Weldy (Piano)  
Lecturers: Fredrick Berry (Jazz Ensemble), Marjorie Chauvel (Harp), Robert Claire (Baroque Flute), Perry Cook (Theory), Floyd O. Cooley (Tuba), John Dornenburg (Viola da Gamba), Gregory Dufford (Clarinet), Charles A. Ferguson (Guitar), Claire Giovannetti (Voice), Alexandra Hawley (Flute), Joyce Johnson-Hamilton (Trumpet), Nicholas Hopkins (Theory), Jay Kados (Audio Recording), McDowell Kenley (Trombone), Mary Linduska (Voice), Janet Maestre (Flute), Robert Claire (Bacheroque Flute), Anthony Martin (Baroque Violin), James Matheson (Oboe), Melinda McGee (Arts Management), Herbert Myers (Early Winds), James O. Nadel (Jazz), Kareen Nagy (Bibliography), Rufus Olivier (Bassoon), Larry S. Ragent (French Horn), Grover Sales (Jazz History), Stephen Sano (Choral Activities), Eleanor Selfridge-Field (Computer Theory), Harold Stein (Piano), Stephen Tramontozzi (Contrabass), Mark Veregge (Percussion)  
Acting Assistant Professor: Maria Johnson  
Visiting Professor, Emeritus: John R. Pierce  
Visiting Assistant Professor: Karla Lemon (Director of Orchestras)  
Teaching Fellow: David Soley  
* Member of Stanford String Quartet (Ensemble-in-Residence)

The Department of Music's aims are to promote the understanding and enjoyment of music in the University at large and to provide specialized training for those who plan careers in music as composers, performers, teachers, or research scholars. The Department is housed in Braun Music Center, Dinkelspiel Auditorium, and The Knoll, including two theaters for concert and operatic productions, two rehearsal halls, and a small chamber hall. In addition to pianos, organs, harpsichords, and a variety of early stringed and wind instruments, students may use rare instruments from the Harry R. Lange Historical Collection. The music library contains a comprehensive collection of complete editions, scores, books, and records. Supplementing this is the Stanford Memorial Library of Music, an invaluable collection of musical manuscripts and first editions. The Doreen B. Townsend Center for Computer Research in Music and Acoustics (CCRMA) provides one of the top-rated facilities for digital sound research in the world. It includes a large computer room with a control room and studio, an all-digital recording studio, a MIDI-based small systems studio, and work areas with terminals, personal computers, synthesizers, and speakers. Offices and workspaces connect with a workstation network; and a gateway connects to the campus-at-large and to national and international networks. 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.

**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. 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 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: Music 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 pass a Piano Proficiency examination as a prerequisite for Music 22, 23, 121, 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 offered at the end of each quarter which demonstrates 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 and 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 Distribution 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>
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<tr>
<td>Freshman English</td>
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<td>3</td>
<td></td>
<td></td>
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<tr>
<td>Music 21, 22</td>
<td></td>
<td>4</td>
<td>4</td>
<td></td>
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<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>
<tr>
<td>Cultures, Ideas, and Values</td>
<td>3-5</td>
<td>3-5</td>
<td>3-5</td>
<td></td>
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<tr>
<td>Choice of Foreign Language, Distribution Requirement, or Freshman Seminar</td>
<td>3-5</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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<tbody>
<tr>
<td>Music 23, 40, 41, and 121</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Individual Instruction and/or Ensemble</td>
<td>1-4</td>
<td>1-4</td>
<td>1-4</td>
<td></td>
</tr>
<tr>
<td>Distribution Requirement</td>
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<tr>
<td>Elective</td>
<td>3-5</td>
<td>(3)</td>
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THIRD AND FOURTH YEARS

<table>
<thead>
<tr>
<th>Courses</th>
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<tbody>
<tr>
<td>Three from Music 140-145 and two from 122A, B, or C</td>
<td>4-8</td>
<td>4-8</td>
<td>4-8</td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>(4)</td>
<td>(4)</td>
<td>(4)</td>
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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 substantial 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, 220A,B, 220C, 220D (4 units); Physics 51 (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.

CONCENTRATIONS

Concentrations are offered in performance, 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.

HONORS PROGRAM

Honors in music are awarded by the faculty to concentrators who have produced an independent project of exceptional quality and distinction. To be eligible for honors a student must petition the department by the end of the junior year. A faculty committee evaluates projects (recitals, compositions, or research papers) considered 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), including the advanced music section. Because the Music GRE is only given twice a year, applicants are urged to register for the exam well in advance of the January 1 application deadline. Students are also required to submit a departmental 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 history of Western music, and (2) a proficiency examination in sight-singing and piano sight-reading are 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. Only work that receives a letter grade indicator (LGI) of ‘A,’ ‘B’ or ‘Satisfactory’ in music courses taken as a graduate student is recog-
organized 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 in residence is required.

Foreign Language Requirement — Reading knowledge of a language other than English must be demonstrated at the beginning of graduate study.

Study Program — Students may concentrate in composition, history, or performance. 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:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>200. Graduate Proseminar</td>
<td>4</td>
</tr>
<tr>
<td>Three quarters of work in the student’s area of concentration</td>
<td>9-12</td>
</tr>
<tr>
<td>Three quarters of ensemble performance</td>
<td>3</td>
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<tr>
<td>223. Composition</td>
<td>4</td>
</tr>
<tr>
<td>or 269. Performance Practice, one of the series</td>
<td>4</td>
</tr>
<tr>
<td>299. Master of Arts Project</td>
<td>4</td>
</tr>
</tbody>
</table>

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.

DOCTORAL PROGRAMS

Residence — The candidate must complete a minimum of three years of full-time work, some of which is planned individually, for each concentration. Doctoral candidates working in absentia on Ph.D. dissertations or D.M.A. final projects that require consultation with faculty members must continue enrollment in the University under Terminal Graduate Registration (TGR).

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 examination for admission to candidacy is given in the sixth 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, but students entering with only a bachelor’s degree are required to take the following course:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>301A,B,C. Music Analysis: Modal, Tonal and Post-Tonal</td>
<td>12</td>
</tr>
</tbody>
</table>

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 and oral examination in the candidate’s special area of concentration is given no later than the third 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. The final project in composition is an extended work for instruments, voices, electronic media, or a combination of these. Music 323, D.M.A. Projects in Composition (16 units) is a required course.

DOCTOR OF PHILOSOPHY

General University regulations for the Ph.D. are discussed in the “Advanced 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) An examination testing knowledge of music and research in the area of special concentration is given no later than the third 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 221, History of Music Theory (8 units) is a required course.

MUSICOLOGY

- 269 or one course in the series
- 300. History of Notation
- 310. Research Seminars in Musicology
- 312. Aesthetics and Criticism of Music

COMPUTER-BASED MUSIC THEORY AND ACOUSTICS

- 220A, B, C. Computer-Generated Music
- 320. The Discrete Fourier Transform

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

GENERAL

1. Introduction to Music — Techniques of active and skillful listening to music, from awareness of the elements of music through musical forms, styles, and aesthetics. DR:7(2)
   3 units, Aut (Hopkins)

2A. The Symphony — Survey of symphonic literature from 1750 to the present, emphasizing developing skills in critical listening. Ability to read music not required. DR:7(2)
   3 units (Staff)

2B. The Concerto
   3 units (Staff)

2C. Opera
   3 units (Mahrt)

2D. The Operas of Mozart
   3 units (Berger)

2E. The Music of Debussy and Ravel
   3 units (Cohen)

2F. The Music of Stravinsky
   3 units (Staff)

3A. The Music of Wagner
   3 units (Staff)

5A. Music in America — Development of popular folk and art music in America from the Pilgrims to the present. DR:7(2)
   3 units, Win (Cohen)

5E. African American Women Making Music: Voices and Images of Change — Demonstrates the continuance of a tradition of African American women making music though a contextualized study of individual musical styles. Expressions of Black female identity from the contributions of early blues women to the contemporary voices of Sweet Honey in the Rock, Gwen Avery, Queen Latifah, etc. Issues of race, gender, and sexuality, and the significance of the images projected by African American women musicians as they reflect, challenge, and transform racist and sexist stereotypes which are the legacy of the minstrel tradition.
   3 units, Aut (Johnson) MW 10:30-12

7A. Ragtime to Bebop (1900-1945)
   3 units, Win (Sales)

7B. Bebop to Present (1945-)
   Prerequisite: 7A
   3 units, Spr (Sales)

4A. The Music of J. S. Bach — Develops awareness and skill in listening to the music of Bach: structure, style, instruments, and aesthetics. Music for the church and chamber: dance music, concerti, cantatas, sonatas, preludes and fugues, and Passions.
   3 units (Staff)

4B. The Music of Mozart
   3 units (Staff)

4C. The Music of Beethoven — The composer’s music and personality through selected masterworks. Ability to read music not required.
   3 units (Grey)

4D. The Operas of Mozart
   3 units (Berger)

4E. The Music of Debussy and Ravel
   3 units (Cohen)

4F. The Music of Stravinsky
   3 units (Staff)

4G. The Music of Wagner
   3 units (Staff)

5A. Music in America — Development of popular folk and art music in America from the Pilgrims to the present. DR:7(2)
   3 units, Win (Cohen)

5E. African American Women Making Music: Voices and Images of Change — Demonstrates the continuance of a tradition of African American women making music though a contextualized study of individual musical styles. Expressions of Black female identity from the contributions of early blues women to the contemporary voices of Sweet Honey in the Rock, Gwen Avery, Queen Latifah, etc. Issues of race, gender, and sexuality, and the significance of the images projected by African American women musicians as they reflect, challenge, and transform racist and sexist stereotypes which are the legacy of the minstrel tradition.
   3 units, Aut (Johnson) MW 10:30-12

7B. Popular Musics Cross-Culturally — Traditions of popular music around the world, exploring cultural similarities and differences in the functions of popular music-making. The roles of composers/performers, marketing and the music industry; the aesthetics of musical performance; and the elements of musical style. Issues and processes of cross-cultural communication and its influence today. Self-designed ethnomusicological field projects.
   3 units, Spr (Johnson) MWF 9

15A. Topics in Interactive Computer-Music Performance — For sophomores only. Real-time interactive performance for interested musicians combining composition, performance, MIDI instruments, and computer programming. Introduction to programming, composition of short pieces, moving beyond familiar styles. Prepares students for work in ensembles such as ALEA II, and CCRMA courses in musical acoustics, advanced programming, and related research issues.
   4 units, Spr (Chafe)

18A. Ragtime to Bebop (1900-1945)
   3 units, Win (Sales)

18B. Bebop to Present (1945- ) — Prerequisite: 18A.
   3 units, Spr (Sales)
19. Introduction to Music Theory — For non-music majors and music majors unable to pass proficiency test for entry to 21. Fundamentals of music notation, basic sight reading, sight singing, ear training, keyboard harmony; also melodic, rhythmic, and harmonic dictation. Skill oriented, using piano and voice as basic tools to develop listening and reading skills.
3 units, Win (Barnes)

20A. Jazz Theory
3 units, Aut (Nadel)

20B. Advanced Jazz Theory
3 units, Spr (Nadel)

191. Arts Management for Performing Artists — 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)

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 are part of series. Students with previous training in theory are urged to take a placement exam given at the beginning of each quarter for admission to more advanced courses.

21. Elements of Music I — Introduction to scales, basic elements of melody and rhythm, simple harmony, sight singing, and dictation. 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. DR: 7(2)
4 units, Win (Rockmaker)

22. Elements of Music II — Extension of melody, counterpoint and harmony, introduction of simple forms, chorale harmonizations. Prerequisites: 21; pass minimum proficiency test in piano, or one quarter prior and concurrent enrollment in 12; or consent of instructor.
4 units, Spr (Rockmaker)

23. Elements of Music III — Chromatic harmony, complex forms. Prerequisites: 22; pass minimum proficiency test in piano, or two quarters prior and concurrent enrollment in 12; or consent of instructor.
4 units, Aut (Hopkins)

40, 41. Music History — The history of Western art music from Gregorian chant to the present day, stressing major styles and genres in their intellectual and institutional settings. Prerequisite: 21.

40. Music History to 1750
4 units, Win (Berger)

41. Music History since 1750
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. Prerequisite: 23.
4 units, Win (Hui)

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 and successful completion of the Ear Training Proficiency examination.
4 units, Aut (Hui)

122B. Harmonic Materials of the 19th Century — Analysis of 19th-century music, with compositional exercises based upon 19th-century models. Prerequisites: 121 and successful completion of the Ear Training Proficiency examination.
4 units, Spr (Hui)

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 or consent of instructor, and successful completion of the Ear Training Proficiency examination.
3 units, Win (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. Prerequisite: consent of instructor.
4 units, Win (Chafe)

123. Undergraduate Seminar in Composition — Individual projects in creative work. May be repeated for credit. Prerequisite: consent of instructor.
3 units, Aut, Win, Spr (Hui)

127. Orchestration — Prerequisite: 23.
3 units, Aut (Barnes)

220. Computer-Generated Music
220A. Fundamentals of Computer-Generated Sound — Introduction to computer-sound generation, composition, acoustics, and computer programming. Prerequisite: experience
in musical composition or consent of instructor.

4 units, Aut (Chafe)

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 (Smith)

220C. Seminar in Computer-Music Research — Individual projects in composition, psychoacoustics, or signal processing. Prerequisite: 220B.

4 units, Spr (Chowning)

220D. Research — Independent research projects in composition, psychoacoustics, or signal processing. Prerequisite: 220C.

1-4 units, Aut, Win, Spr (Staff)

223. Seminar in Composition — May be repeated for credit.

4 units, Aut (Soley)

Win (Rockmaker)

Spr (Hopkins)

HISTORY AND LITERATURE

140,141,142,143,144,145. Seminars in Music History — Specialized topics within music history, each offered at least once within any two-year period. Topics vary each year.

140. Studies in Medieval Music — Prerequisite: 40.

given 1995-96

141. Studies in Renaissance Music — Prerequisite: 40.

given 1995-96

142. Studies in Baroque Music — Prerequisite: 40.

given 1995-96

143. Studies in Classic Music — Prerequisite: 41.

4 units, Spr (Berger)

144. Studies in Romantic Music — Prerequisite: 41.

4 units, Aut (Barth)

145. Studies in Modern Music — Prerequisite: 41.

4 units, Win (Hinton)

150A. Gregorian Chant

4 units (Mahrt)

151. Psychophysics and Cognitive Psychology for Musicians — (Same as Psychology 268.) Basic concepts and experiments relevant to 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.

1-3 units, Aut (Chowning, Cook, Matthews, Pierce, Shepard)

154. Introduction to Computer Music — Survey of recent works and computer-based techniques.

4 units, Spr (Chafe, Staff)

198. Concentrations Project

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 a specific project and enlist a faculty sponsor.

1-4 units, Aut, Win, Spr (Staff)

PERFORMANCE

GROUP INSTRUCTION

Note — Special fee of $75 per quarter (subject to revision) for 12A,B,C (non-majors); 65A,B, 72, 73, 74, 75, 76, 77.

12A,B,C. Introductory Piano — (A=level 1; B=level 2; C=level 3) Preference to music majors.

1 unit, Aut, Win, Spr (Staff)

65A. Voice Class I — Large-group beginning voice for the non-major.

1 unit, Aut, Win, Spr (Giovannetti)

65B. Voice Class II — Large-group instruction for non-majors with previous vocal training.

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 (Giovannetti)

65D. Jazz Solo Voice Class — For students with previous experience in solo singing. The study and performance of contemporary solo vocal repertoire of the popular and jazz idiom. Recommended: basic knowledge of music theory/harmony.

1 unit, Spr (Sano)

72,73,74,75,76,77. Small Group Instruction — Minimum enrollment required.

1 unit, Aut, Win, Spr

72A. Piano Class — For intermediate students.

(Staff)

72B. Organ Class — For beginning organ students who have keyboard skills.

(Staff)

73. Voice Class

(Giovannetti)

74A. Stringed Instruments Classes

(Harrison, Kleyman)
74C. Classical Guitar Class  
(Ferguson)  
74D. Harp Class  
(Chauvel)  
75A. Wind Instruments Classes  
(Maestre)  
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 $150 per quarter for majors and $300 for non-majors (subject to revision). Prospective students must demonstrate, by audition with the appropriate teacher, a minimum proficiency on instrument. Minimum-repertoire lists for each instrument are available at department office. 270-level courses are for advanced students.  
3 units, Aut, Win, Spr  

172/272. Keyboard Instruments  
172A/272A. Piano  
(Barth, Weldy, Staff)  
172B/272B. Organ  
(Staff)  
172C/272C. Harpsichord  
(Staff)  
172E/272E. Early Piano  
(Barth)  

173/273. Voice  
(Giovannetti, Linduska, Wait)  

174/274. Stringed Instruments  
174A/274A. Violin  
(Freier, Kleyman, Levy)  
174B/274B. Viola  
(Kleyman, Simon)  
174C/274C. Violoncello  
(Harrison)  
174D/274D. Contrabass  
(Tramontozzi)  
174E/274E. Viola da Gamba  
(Dornenburg)  
174F/274F. Classical Guitar  
(Ferguson)  
174G/274G. Harp  
(Chauvel)  
174H/274H. Baroque Violin  
(Martin)  
174I/274I. Early Plucked Strings  
(Staff)  

175/275. Woodwind Instruments  
175A/275A. Flute  
(Blaisdell, Hawley, Maestre)  

175B/275B. Oboe  
(Matheson)  
175C/275C. Clarinet  
(Dufford)  
175D/275D. Bassoon  
(Olivier)  
175E/275E. Recorder  
(Myers)  
175F/275F. Saxophone  
(Stein)  
175G/275G. Baroque Flute  
(Claire)  

176/276. Brass Instruments  
176A/276A. French Horn  
(Ragent)  
176B/276B. Trumpet  
(Johnson-Hamilton)  
176C/276C. Trombone  
(Kenley)  
176D/276D. Tuba  
(Cooley)  

177/277. Percussion  
(Veregge)  

PERFORMANCE PRACTICES  
130. Elementary Conducting  
130A. Introduction to Conducting — Fundamentals of baton techniques and rehearsal procedures. Development of coordination of the members of the body involved in conducting; fluency in the various beat patterns and meters; dynamics, tempi, cueing, and use of the left hand in conducting.  
3 units, Aut (Sano)  
130B. Elementary Orchestral Conducting — Techniques specific to the conducting of orchestral ensembles. Prerequisites: 127, 130A.  
3 units, Win (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, Spr (Sano, Wait)  

181. Performance of Vocal Literature  
181A. Standard Repertoire  
1 unit, Aut, Win, Spr (Wait)  
181B. German Song Repertoire  
1 unit, Aut (Linduska)  

230. Advanced Orchestral Conducting  
4 units, Aut, Win, Spr (Lemon)  

231. Advanced Choral Conducting  
4 units, Aut, Win, Spr (Wait)
270. Graduate Seminar in 20th-Century Performance Practice — Intensive practical instruction in new-music notation, instrumental techniques, and new-music aesthetics. For composers, performers, and musicologists. Open also to qualified undergraduates.

270A. 4 units (Staff)
270B. 4 units (Staff)

ENSEMBLE

These courses may be repeated for credit but are subject to the 12-unit activity class limitation policy. An audition is required for admission to any University musical organization. Membership is open to all students including those who do not register for credit. Audition schedules are announced before each registration period.

158. Contemporary Performance Ensemble
1 unit, Aut, Win, Spr (Lemon)

159. Early Music Singers
1 unit, Aut, Win, Spr (Mahrt) TTh 12-2

160. University Orchestra
1 unit, Aut, Win, Spr (Lemon) TTh 7:15 p.m.

161. University Bands
161A. University Symphonic Band
1 unit, Aut, Win (Barnes) MF 12-1, W 7:30-9:30 p.m.
Spr (Johnson-Hamilton)

161B. Jazz Ensemble
1 unit, Aut, Win, Spr (Berry) MW 4:15-6:05

161C. Sports Activity Bands
1 unit, Aut (Barnes) MWF 12-1:30
Win, Spr (Barnes) by arrangement

162. University Symphonic Chorus
1 unit, Aut, Win, Spr (Sano) W 7:30-10 p.m.
W 4:15-5:30

163. University Choir — Official choir of Memorial Church, which furnishes music for Sunday services and special occasions in the church calendar.
2 units, any quarter (Wait)
Th 6:30-8:30 p.m. and Su 10-12

165. Stanford Chamber Chorale — Small vocal ensemble specializing in performance music of all periods for the chamber chorus.
1 unit, Aut, Win, Spr (Wait) MWF 12

167. University Singers
1 unit, Aut, Win, Spr (Sano) TTh 12-1:30

170. Piano Accompanying
170A. Piano Accompanying
1 unit, Aut, Win, Spr (Weldy)

170B. The Literature and Practice of Accompanying
1 unit, Aut, Win, Spr (Weldy)

171. Chamber Music — Open to any student with sufficient technical ability to play in small combinations for strings, winds, and keyboard instruments.
1 unit, Aut, Win, Spr (Freier, Levy, Staff)

192. Theory and Practice of Audio Recording
192A. Foundations of Sound Recording Technology — Topics: elementary electronics, physics of transduction and magnetic recording of sound, acoustic measurement techniques, operation and maintenance of recording equipment, recording engineering principles. Prerequisites: 151, 220A,B,C; high-school level algebra and physics.
3 units, Aut (Kadis)

192B. Advanced Sound Recording Technology — Topics: digital audio including current media, formats, editing software, and post-processing techniques. Also, microphone selection and placement, grounding and shielding techniques, noise reduction systems and advanced multi-track techniques. Prerequisite: 192A.
3 units, Win (Kadis)

192C. Session Recording — Independent engineering of recording sessions. Prerequisites: 192A,B.
1 unit, Aut, Win, Spr (Kadis)

192D. Digital Multimedia Introduction — Introduction to authoring and mastering tools for digital audio and multi-media, including CD, CD-ROM, and related formats. Prerequisites: 192A,B.
1 unit, Aut (Schwanauer)

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 (Berger, 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 (Cohen) given 1995-96
221B. Baroque Through Modern
4 units, Aut (Cohen)

242. Seminar: Topics in Computer Music
242A. Musical Information: An Introduction
1-3 units, Win (Selfridge-Field)
242B. Computer Analysis and Synthesis of the Voice
1-3 units, Spr (Cook)
269. Research in Performance Practices—Performance techniques, theoretical principles, aesthetics, and musical resources of various historical periods.
4 units, Aut, Win, (Staff) by arrangement
Spr (Barth)

299. Master of Arts Project
4 units, any quarter (Staff)

300A,B. History of Notation
300A. 4 units, Win (Mahrt)
300B. 4 units, Spr (Mahrt)

301A. Modal Analysis
4 units, Spr (Mahrt)
301B. Tonal Analysis
4 units, Win (Grey)
301C. Post-Tonal Analysis
4 units, Aut (Rockmaker)

302. Research in Musicology
4 units, Aut, Win, Spr (Staff) by arrangement

310. Research Seminar in Musicology
4 units, Aut (Gray)
Win (Hinton)
Spr (Berger)

312A,B. Aesthetics and Criticism of Music—Intensive reading of selected major primary texts.
8 units (Berger) given 1995-96

319. Research Seminar on Computational Models of Sound Perception
1-3 units, Aut, Win, Spr (Schubert)

320. The Discrete Fourier Transform (DFT)—Fundamentals of spectrum analysis for discrete-time signals emphasizing digital/audio applications. Topics: complex numbers, signal theory, the DFT, fundamental Fourier theory, and basic Fourier pairs. Prerequisites: Math. 42, 103; Physics 51, or equivalent.
2-4 units, Aut (J. Smith)

321. Readings in Music Theory
3 units, any quarter (Staff) by arrangement

323. D.M.A. Term Projects in Composition
4 units, Aut, Win, Spr (Rockmaker, Staff)

341. Ph.D. Dissertation
1-12 units, any quarter (Staff)
by arrangement

399. D.M.A. Final Project
1-9 units, any quarter (Staff)
by arrangement

420. Applications of the Fast Fourier Transform (FFT)—Spectrum analysis and signal processing using the FFT, emphasizing audio applications. Topics: FFT windows, cyclic and acyclic convolution, zero padding, spectrum analysis of deterministic and stochastic signals, the overlap-add and filter-bank summation methods for short-time Fourier analysis, modification, and resynthesis; transform coders, tracking sinusoidal peaks across FFT frames, and modeling time-varying spectra as sinusoids plus filtered white noise using the FFT for both analysis and resynthesis. Prerequisites: Electrical Engineering 104, 261.
2-4 units, Win (Cook)

421. Signal Processing Methods in Musical Acoustics—Computational models of musical instruments in the wind and string families based on physically accurate mathematical models. Models are designed to capture the “audible physics” of musical instruments using computationally efficient algorithms and signal processing techniques. Topics: mass-spring systems, discrete-time simulation, the one-dimensional wave equation, traveling waves, wave impedance, signal energy and momentum, lumping of losses and dispersion, simulation of one-dimensional waveguides such as vibrating strings and woodwind bores, allpass techniques for tuning and stiffness simulation, scattering theory, lattice/ladder digital filter theory, and complete models of winds and strings using delay lines, scattering junctions, low-order digital filters, and nonlinear junctions implementing oscillation sources such as bow-string and reed-bore couplings. Techniques are outlined for calibrating model parameters to recordings of real instruments. Prerequisites: Electrical Engineering 12, 104.
2-4 units, Spr (J. Smith)

OVERSEAS STUDIES PROGRAM

Stanford Program in Berlin
Director: Karen Kramer
Associate Director: Maria Beige
Faculty: William Eddelman, Dubravka Friesel-Kopecki, Petra Herz, Therese Hörnigk, Hans-Peter Krüger, Franz Neckenig, Maurice Rehm, Jürgen Schutte, Sylke Tempel, Jochen Wohlfeil

Stanford Program in Florence
Director: Ermelinda Campani
Faculty: Nicola Bellini, Francesco Benvenuti, Patrizio Bianchi, Dario Biocca, Eve Borsook, George Collier, Jane Collier, Roberto D’Alimonte, Ann Katherine Isaacs, Giuseppe Mammarella

Stanford Center for Technology and Innovation—Kyoto
Director: Terry MacDougall
Students remain registered at Stanford and pay the usual tuition and overseas fees. Regular financial aid rules apply and aid is often increased to cover the cost of transportation and other expenses of living abroad. Students have a variety of housing options, depending upon the center; students live with families, with local students in apartments, in the Stanford Center, or in local university dormitories. Courses offered abroad carry regular Stanford University credit; some also receive credit toward department majors.

Overseas Studies, located on the first floor of Sweet Hall, has a full-time staff to assist students in planning all aspects of their programs abroad. The information below, while accurate at the time of printing, is subject to change. Overseas Studies updates this information periodically.

**COURSES**

**BERLIN**

29. The Political Economy of Contemporary Germany — Survey of 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.

4-5 units, Spr (Kruger)

100X. The History of German and European Economic Philosophy — (Same as Economics 100X, History 129V, Political Science 161X; also listed as International Relations Cluster A and C.) The intellectual history of a region that has 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. DR:8(3)

4-5 units, Aut (Kruger)

100A. German Theater — (Same as Drama 101A, German Studies 195.) Texts of plays are supplemented by theoretical writings of 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. DR:7(2)

4-5 units, Aut (Kramer)

117V. 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 posi-
120X. New Ways of Seeing — (Same as Art 120X.) Art objects in the Berlin cityscape, museums, and galleries as historical symbols. The cultural and ideological movements of the various epochs through an analysis of form and content, ground plan and façade, artistic details, aesthetic effects, and symbolic meanings. DR:7(2) 4 units, Win (Neckenig)

128X. Transition in Germany and Eastern Europe — (Same as Economics 128X; also listed as International Relations Cluster C.) The transformation process in Eastern Europe has goals of gaining political democracy and a market economy within the shortest time. The economic and political aspects: macroeconomic stability, international opening, and privatization. The reasons behind the division of Europe after WWII emphasizing the division of Germany, commonalities, and special features of the emerging Stalinist societies. The revolutions and tasks of revolutionary governments after the breakdown of communism. The role of the West, especially the EC. Readings: Clay, Hayek, Kornai, Lange, Sachs, and empirical data from Eastern Europe and the EC. Economics majors take 5 units. DR:9(5) 4-5 units, Win (Krüger)

129E. Modernism and Metropolis: Turn-of-the-Century Culture in Berlin — (Same as German Studies 129E.) Cultures high and low in turn-of-the-century Berlin. Themes: literary and artistic Naturalism, early Expressionism, working-class culture, the anti-urban women’s movement, and Jewish culture. DR:7(2) 4 units, Aut (Schutte)

143U. Architecture and the City, 1871-1990: Berlin as Nucleus of Modernity — (Same as Urban Studies 143U, Art 174Y, History 229V.) Urban Berlin since the Gründerzeit. Architectural “corrections” attempted in post-Communist East Berlin and on the drawing boards. Dual perspective of the major architectural movements of the century and reconstruction of shifting roles of Berlin during unifications of 1871 and 1990. DR:7(2) 4 units, Aut (Neckenig)

158C, An Introduction to Modern German Cinema — (Same as Drama 158C, German Studies 134B.) Introduces a variety of German cinema from the 1930s to the flowering of das neue Kino movement. The socialist and leftist perspectives of (early) Pabst and Brecht. Nationalistic and pro-Nazi films of Trenker (folk-fiction), Riefenstahl (documentary), and Liebeneiner (“historical”). The postwar Trummerfilme (“rubble film”) in the work of Stemmler. The renaissance of das neue Kino (Schlondorff, Herzog, Wenders, and Fassbinder). Weekly screenings of films followed by discussions and supplemented with lecture/discussions which place the film and director in their historical and cultural moment. Secondary readings on the history of German cinema, directors, and the larger social and political backdrop. 4 units, Win (Rehm)

158N. Weimar Culture: Theater and Film — (Same as Drama 158N.) Focuses on two major cultural/artistic components that defined Weimar culture from 1918-1933 and the period in 20th-century culture in which “outsider” becomes “insider.” Topics: common bonds of Expressionism, the influence on film of the theatrical work of such directors as Max Reinhardt, new technologies in theater and film. 4 units, Spr (Eddelman)

158T. Greek Tragedy and German Culture: An Artistic Symbiosis — (Same as Drama 158T, German Studies 174B.) The influence of Greek tragedy on Modern German artistic production from Göthe to Muller. Beginning with Nietzsche’s The Birth of Tragedy, compares a specific Greek tragedy with a German work that draws on the Greek original. The changing historical and social conditions that may account for the direction of the adaptation or reinterpretation. Focus is on Euripides, Sophocles, and Aeschylus and their influence on works of Brecht, Göthe, von Hofmannsthal, Muller, Strauss, von Trotta, and Wagner. 4 units, Win (Rehm)

166B. Women, Literature, and Transitions in Germany — (Same as German Studies 166B.) 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 great 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. 4 units, Win (Hörnigk)

168B. Berlin in Literature — Literature in Berlin — (Same as German Studies 168B.) Historical understanding of 20th-century literature in Berlin as
a reflection of the modern experience of metropolis and the opportunity to participate in present-day literary discourse. Topics: Berlin from Gründungszeit to Expressionism, literary avant-garde, Berlin under the swastika, burned books and their authors, a divided and unified city in literature, literary spaces physical and conceptual.

4 units, Spr (Hörnighk)

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. A variety of genres: literary, analytical and theoretical texts, newspaper articles, film/TV, oral history. DR:9(5)

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.

4 units, Aut (Tempel)

179B. Split Images: Post-War German Cinema — (Same as German Studies 179B; also listed as International Relations Cluster B.) New German film cultures in the postwar period. Critical tools of film literacy and political and aesthetic representations of two cultures. Contemporary trends in cinema, including participation in the Berlin Film Festival. DR:7(2)

4 units, Spr (Kramer)

258W. CD-Rom and Cultural Reconstructions — (Same as Drama 258W.) Contemporary computer technology as means of creating an analytical approach to a cultural period. Development of CD-Rom that explores cultural complexities and changes occurring in Berlin in 1920s and 30s.

4 units, Spr (Eddelman)

GERMAN LANGUAGE PROGRAM

3B. German Language and Culture — (Same as German Studies 3B.) Grammar, composition, and conversation. Designed to increase students' fluency in German language as rapidly as possible and to help them take advantage of the many opportunities in Berlin. Offered depending on demand.

6 units, Aut (Herz)

Win, Spr (Rohr, Biege)

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)

101B. Advanced German — (Same as German Studies 101B.) For advanced students who wish to expand their knowledge of the German language and become more familiar with the finer points of German grammar and style.

4 units, Aut, Win, Spr (Friesel, Kopecki)
Florence are used to understand the traditions from which they sprang. How Florence became the center for artistic innovation for 250 years, and how this status was shifted to Rome and Venice. DR:7(2)
4 units, Aut (Borsook)

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 great changes in Italian society from the aftermath of WWI 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. DR:7(2)
4 units, Aut (Campani)

141A. Renaissance Europe and the World's Others — (Same as Anthropology 141A.) Renaissance Europe's view of the rest of the world as experienced and imagined in the context of the Mediterranean, in overseas commerce and colonization, and in engagement with the New World, Africa, S. Asia, and E. Asia. Renaissance thinking about the rest of the world from an Italian perspective, considering Venice's contacts with the East, the princely court of the Medici, the role of Italian monastic orders in overseas evangelization, and the early-modern Italian re-imaginings of Egypt and Ethiopia. DR:9(5)
5 units, Aut (G. Collier)

145X. The Integration of Europe — (Same as Political Science 145X; also listed as International Relations Clusters A and C.) 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, discussion of challenges faced by the Community today. DR:9(5)
4-5 units, Aut (D'Alimonte)

157A. Issues in Italian Law — (Same as Anthropology 157A.) Seminar introduction to the development and functioning of civil law systems focusing on the Italian. Italian civil law is contrasted with the U.S. common law system by comparing the legal profession, civil law, and criminal law. Issues: women's rights, human rights, immigration law, the protection of Italy's cultural heritage, and legal problems deriving from integration of European Community.
5 units, Aut (J. Collier)

159X. The Political Economy of Industrial Change: Italy and Europe in a Global System — (Same as Economics 159X; also listed as International Relations Cluster C.) Analysis of structural change and new tendencies of industrial systems. 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. DR:9(5)
5 units, Win (Bianchi, Bellini)

233V. The Implications of the Fall of Communism for Italian Domestic Internal Politics — (Same as History 233V.) 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.
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.
4-5 units, Aut (Biocca)

ITALIAN LANGUAGE PROGRAM

20F. Second-Year Italian, First Quarter — (Same as Italian 20F.)
5 units, Aut, Win (Staff)

24F. Second-Year Italian, Second Quarter — (Same as Italian 24F.)
5 units, Aut, Win (Staff)

98F. Intensive Italian — (Same as Italian 98F.) Required of all students wishing to attend courses at the University of Florence (UF). Facilitates immersion into UF and includes relevant information regarding the Italian university system. Only students who pass the proficiency exam are admitted to the UF.
2 units, Aut (Staff)

110F. Advanced Grammar and Composition — (Same as Italian 110F.)
4 units, Aut (Staff)

111F. Advanced Grammar and Composition — (Same as Italian 111F.)
4 units, Win (Staff)

KYOTO

40. Introductory Electronics — (Same as Engineering 40.) 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 functions of electronic components including ideal diodes
and transistors; tuned circuits. Self paced course. Lab available. Prerequisites: Physics 53 or equivalent, one calculus course, elementary competence on personal computers. DR:6(8)

5 units, Spr (Masters)

129X. The Economics of Technology Management in the Japanese Firm — (Same as Economics 129X.) The Japanese firm and relationships between firms and suppliers, firms and dealers downstream, and firms and the government. Focus is on technology including product development organization, the career of engineers in Japan, joint R&D ventures, and industrial policy related to innovation.

5 units, Spr (Staff)

178. Energy and Climate Change: The Japanese Approach — (Same as Civil Engineering 178.) A comparison of policy and technological approaches taken in Japan and the U.S. to reduce dependence on nonrenewable fossil fuels and avert global climate change. Energy supply and end uses in the two countries, status of energy efficiency and renewable energy technologies, comparison of energy and environmental policies.

3 units, Spr (Masters)

198K. Japanese Technology Management — (Same as Engineering 198K.) Focus is on issues and processes of technological innovation employing a case study method of analysis and meetings with technologists and other leaders of Kansai area companies. Group and individual research. DR:6(8)

3 units, Spr (Masters)

215X. The Political Economy of Japan — (Same as Political Science 215X; also listed as International Relations Cluster C.) 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. DR:9(5)

5 units, Spr (MacDougall)

JAPANESE LANGUAGE PROGRAM

3K. First-Year Modern Japanese — (Same as Asian Languages/Japanese 3K.)

5 units, Spr (Fujiwara, Ueda)

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)

MOSCOW

113W. Sociology and Social Psychology of Modern Russian Society — (Same as Psychology 129P, Sociology 113W.) Focuses on the social and psychological processes that are an integral part of the Russian mentality by surveying issues in Russian contemporary life. Topics: the sociology of enterprise, political life, everyday culture, business negotiation, and science and education.

5 units, Aut (Yurevitch)

116W. Social Structure and Culture of Everyday Life in Russia — (Same as Sociology 116W.) Introduces key sociological concepts and ideas helpful in understanding everyday life in Russia, by observing and analyzing social settings and social interaction.

5 units, Aut (Tuma)

119X. Russian Politics — (Same as Political Science 119X; also listed as International Relations Cluster A.) 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. Emphasis is on the origin of major interest groups and political concepts affecting the struggle in Russia in order to learn the complex 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. DR:9(5)

5 units, Aut (Bratersky)

121V. Russia in the Age of Nobility 1700-1840: State, Society, and Culture — (Same as History 121V.) Insight into one of most brilliant, colorful periods of Russian history and culture, wherein Russians produced many achievements in literature and the arts but failed to resolve the social and institutional problems created by rapid transformation. Reforms of Peter the Great through Slavophile-Westemisers controversy established the major paradigms of Russia’s historic development and helped raise issues still determining the intellectual agenda today.

5 units, Aut (Zorin)

125X. Russian Economy: Past Experience, Current Reform, and Future Prospects — (Same as Economics 125X; also listed as International Relations Cluster C.) The Russian economy before Oc-
ober 1917, special features of Russian capitalism, and the main reasons for the October revolution. Analysis of the Soviet economy and the principals of central planning.

5 units, Aut (Panova)

RUSSIAN LANGUAGE PROGRAM

51M. Second-Year Russian I — (Same as Slavic Languages 51M.)
6 units, Aut (Kuznetsova)

111M. Third-Year Russian I — (Same as Slavic Languages 111M.)
6 units, Aut (Boldyreva)

177M. Advanced Russian I — (Same as Slavic Languages 177M.)
6 units, Aut (Grinyuk)

OXFORD

19. The Economic Organization of Science and Technology in the West Since 1600 — Comparative institutional analysis of the historical emergence and development of three modes of organizing scientific pursuit of knowledge. The underlying economic logic of salient institutional features and 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)

19B. Contemporary Issues in Physics — (Same as Physics 19B.) Introduction to research and contemporary scientific issues commensurate with interest and knowledge. Opportunities for research, establishment of contacts, participation in experiments.

3-5 units, Spr (Dimopoulos)

21. Art in Britain
units by arrangement, Win (Staff)

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.) A history of immigration and the settlement of ethnic minority groups in Britain: work, discrimination, attempts to achieve economic opportunity and equality. Synthesis between West Indian, Asian, African, and traditional English cultures.

3 units, Win (Lustgarten)

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 (Gearin-Tosh)

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 (Gearin-Tosh)

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 of the theoretical ways sociologists analyze societies and social change.

4-5 units, Spr (Davies)

119E. British Media in Transition — (Same as Communications 119E.) How organizational structure and mission affect output. Topics: the reorganization of commercial television and allocation of licenses on the basis of bidding, massive changes in BBC organization, the growth of Rupert Murdoch's satellite-to-home service B-Sky-B and shifts in Channel 4's financial underpinnings.

4 units, Aut (Breitrose)

122E. The Documentary Tradition — (Same as Communications 122E.) The idea of the documentary, and the evolution of the film and television documentary from its beginnings in descriptive urban sociology and advocacy journalism of 19th-century England. Resources: British Film Institute, the BBC, commercial television companies, Imperial War Museum, National Film and Television School in Beaconsfield, Bucks.

4 units, Aut (Breitrose)
131W. English Social History 1800-1980 — (Same as Sociology 131W, History 140V.) Seminar. The onset of industrialization at the end of the 18th century has gradually affected all aspects of English life: the standard of living, home and family, the nature of work, and patterns of leisure. How these changes occurred and how they were viewed by contemporaries. DR:9(5)
5 units, Win (Tyack)

141V. European Imperialism and the Third World, 1870-1970 — (Same as History 141V, Political Science 148X; also listed as International Relations Cluster A.) European imperialism from its zenith in the late 19th century to the era of decolonization after WWII. The effects of western imperialism in different parts of the "Third World." The legacy of imperialism and decolonization to the modern world. DR:9(5)
5 units, Spr (Darwin)

146V. Modern African History through the African Novel, 1900-1970 — (Same as History 146V, English 189Y; also listed as International Relations Cluster B.) 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. DR:9(5)
5 units, Aut (Kirk-Greene)

147X. European Integration — (Same as Political Science 147X; also listed as International Relations Clusters A and C.) Themes: the institutional arrangements that have been made and how industry and citizens adapt. National sovereignty, political and human rights, social welfare, increased competitiveness in a world of rapid technological and political change. The effects of the dissolution of the Soviet Union on Europe’s changing political and security interests. DR:9(5)
4-5 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, Spr (Wordsworth)

154Y. 19th-Century British Poetry — (Same as English 154Y.) The main English poets from Wordsworth to Hardy. The poetry of the period in its cultural and historical context, and the development of poetic language from a literary angle. The relationship between poetry and its context, the evolution of style in relation to established forms, and the development of language to describe new states of feeling.
5 units, Aut (Dodd)

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)

157E. Black Theater in England — (Same as Drama 157E.) The development and practice of black theater in England: its economic and social relationships to the position of blacks; the influence of Caribbean, African and African-American culture on black British theater; manifestation of the black voice; and black women’s theater. DR:7f(2)
4 units, Win (Elam)

158J. Jacobean Drama 1600-1642 — (Same as Drama 158J.) Shakespeare’s contemporaries, 1600-1642: power, gender, and the social environment as manifested in plays; revenge, stoicism, pessimism; the language and structure of plays, and the relation to the theatrical practices and conventions of the times. DR:7(2)
4 units, Win (Elam)

167X. European Economies in a Changing World — (Same as Economics 167X; also listed as International Relations Cluster C.) Selected aspects of international economics, mainly from an empirical perspective. Current issues in European economic policy using conventional economic theory. Topics: the economics of the single European market, competitiveness in European economies in the 1990s, achievements of European Monetary System and prospects for European Monetary Union, consequences of agricultural protectionism in EC. Prerequisite: Economics 1 or equivalent. Recommended: Economics 51 or 52. DR:9(5)
4-5 units, Win (Crafts)

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. Extensive student participation.
4 units, Aut (Getzler)

173X. Shakespeare: The Comedies — (Same as English 173X.) Open only to students majoring in Drama, English, and related subjects. Taught jointly for Stanford students and second-year St. Catherine’s undergraduates. First part of a study of the complete dramatic oeuvre of Shakespeare. Focus is on the sources of the plays, their historical context, their dramatic content and their use of language.
5 units, Aut (Gearin-Tosh)
OVERSEAS STUDIES PROGRAM

173Y. Shakespeare: The Tragedies—(Same as English 173Y.) Open only to students majoring in Drama, English, and related subjects. Taught jointly for Stanford students and second-year St. Catherine's undergraduates. Second part of a study of the complete dramatic oeuvre of Shakspere. Focus is on the sources of the plays, their historical context, their dramatic content and their use of language.
5 units, Win (Gearin-Tosh)

173Z. Shakespeare: The Late and Problem Plays—(Same as English 173Z.) Open only to students majoring in Drama, English, and related subjects. Taught jointly for Stanford students and second-year St. Catherine's undergraduates. Third part of a study of the complete dramatic oeuvre of Shakspere. Focus is on the sources of the plays, their historical context, their dramatic content and their use of language.
5 units, Spr (Gearin-Tosh)

190B. Great Ideas in Physics and Cosmology—(Same as Physics 190B.) Themes: unification, symmetry and order, group theory, chaos and disorder, entropy, relativity, uncertainty and complementarity. Alleviation of mathophobia; ideas and intuition as the primary tools of physics; influence of historical, cultural, intellectual developments in humanities.
DR:5(7)
3-5 units, Aut (Dimopoulos)

221Y. Art and Society in Britain 1870-1939—(Same as Art 221Y, History 244V.) Themes in late 19th- and early 20th-century British art: the Arts and Crafts movement, aestheticism, perception of modernism, the effects WWI. Painting, sculpture, architecture, and design compared to the British experience and that of the continent of Europe and the U.S. Problems relating to the role of art and the artist in modern society. Prerequisite: Art 120Y or equivalent.
5 units, Spr (Halevi)

243V. Urban History in Britain, 1500 to the 20th Century—(Same as History 243V, Urban Studies 146U.) The development of Britain's towns and cities: the physical growth, why towns grew at different periods, the effect of Britain's changing economy over past 200 years, housing and community problems, and contemporary urban problems.
DR:9(5)
4 units, Aut (Tyack)

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.
DR:7(2)
4 units, Aut (Mateer)

PARIS

26. Health Systems and Health Insurance: France and the U.S. — A Comparison — 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?
4 units, Win (Giraud)

120Z. French Painting from 1780-1900—(Same as Art 120Z.) Changes in artistic aims throughout the period, the use of perspective and its significance, and the relation to 18th-century society. Field trips to museums holding paintings of David, Daumier, Degas, Delacroix, Courbet, Ingres, Manet, and others. DR:7(2)
4 units, Win (Halevi)

121X. The Left in Western Europe—(Same as Political Science 121X, Sociology 115W; also listed as International Relations Cluster A.) Left and Right are the two most important categories of European political life, culture, and identity. The Left in Europe. Historical, sociological, and political science methods of analysis are 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. The interaction between the various components and their influence on the development of the Left as a whole.
4 units, Win (Lazar)

122X. French and European Economies in Today's World—(Same as Economics 122X.) Applied macro-economics and real economies, their relations with one another and with the rest of the world. Long-term historical developments and international comparisons. Theories and concepts are introduced as tools that make complexity easier to grasp and as answers to questions raised over real issues.
5 units, Aut (Balleix)

137V. An Outline of the History of France—(Same as History 137V, French 151P.) Required (except for students in French 127P) survey of French history covering, in eight sessions, the history of France from the Middle Ages through WWI. The French Monarchy, the birth of the French nation, the French Revolution, the First and Second
Empires, and the Third Republic. Provides a context and framework for the students' work in Paris.

3 units, Aut, Win (Chebel-d'Appollonia)

176P. Poetics of Paris—(Same as French 176P.) Paris through songs, film, painting, literature, and social and artistic practices.

4-5 units, Aut (Apostolidès)

178U. The Architecture of Paris: Buildings and Urban Forms, 1750-1990—(Same as Urban Studies 178U, Art 175Y.) The architecture of Paris from the Enlightenment to the 20th century. The examination of specific buildings and/or urban sites, and identifying their architectural traits and urban character. Architectural periods and styles, emphasizing their specific contribution to the formation of the city landscape. Discussion, site visits, readings, and essays on contemporary city life. DR:7(2)

4-5 units, Aut (Legault)

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. DR:9(5)

4-5 units, Aut (Mayer)

230V. Social History of Modern France—(Same as History 230V.) Seminar on the social underpinnings of the transformation of modern France. Economic and social change with regard to long-term historical trends from the perspective of social actors. Topics: the structure of the labor force, women's role in economy and society, the demographic question, migration since the turn of century, the Jewish experience in France, colonialism and the social impact of decolonization. DR:9(5)

5 units, Win (N. Green)

250P/251P. Humanities Seminar: History of the Intellectual movements in 20th-Century France—(Same as French 250P/251P.) Two-quarter seminar providing the opportunity to write a research paper on a topic related to the course work and intellectual interests students are pursuing in Paris. Common readings address aspects of the French Intellectual Movements of the 20th century. Students present a proposal describing the research topic; draft papers are circulated for group discussion. In French

4 units, Aut (Apostolidès)

5 units, Win (Apostolidès)

284P. Love: A Comparative Study in Classic and Modern French Novels—(Same as French 284P.) Selection of French novels, 17th-20th century, where the theme of love plays an important role (la Princesse de Clèves, Manon Lescaut, les Secrets de la Princesse de Cadignan, la Chartreuse de Parme, A l'ombre de jeunes filles en fleur, Belle du Seigneur, l'Amant). The emergence of love, confession, death as dénouement, and narrative variants (form of narrative, the narrative statement and point of view). Students trace common references, comprehending the evolution of French culture and sensibility. In French and English

4 units, Aut (Ottenwaelder)


4-5 units, Win (Apostolidès)

FRENCH LANGUAGE PROGRAM

21P. Intermediate French I—(Same as French 21P.)

5 units, Aut, Win (P. Green)

23P. Intermediate French II—(Same as French 23P.)

5 units, Aut, Win (Grée)

124P. Advanced French I—(Same as French 124P.)

5 units, Aut (Ricci)

125P. Advanced French II—(Same as French 125P.)

5 units, Win (Ricci)

127P. Intensive Advanced French—(Same as French 127P.) Orientation course for students enrolling in the Paris University system.

3 units, Aut (Leca)

SANTIAGO

5. Director's Seminar I—Weekly seminar with presentations on current issues and events in Chilean political and cultural life.

2 units, Aut (Fuenzalida)

11. Research Methods—Open only to students enrolled in Research Module. Preparatory seminar on research methods offered in each research module by the person who is the primary research supervisor for the students. Students develop project topics and research designs. Corequisite: enrollment in Research Tutorial.

2 units, Win (Staff)

12. 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: enrollment in Research Methods.
5 units, Win (Staff)

13. Director's Seminar II — Required for students enrolled in Research Modules; open to all other students. Overview of the research process in the Chilean context.
3 units, Win (Fuenzalida)

18. Women in Latin America: Gender, Politics, and Society — The process of emergence of women in the different spheres of social life in the Latin American societies during the last 20 years. Analysis of the social situation of women, the theoretical elaborations about the social construction of the genders, and the case in Latin America and of the present strategies to overcome the lack of opportunities for women.
4-5 units, Win (Valdez, Weinstein)

19. Political and Social Transformations in Latin America — Latin American society of the post-WWII period, changes of the 60s, the authoritarian phenomena, and the later democratization processes. Analysis of the State, the system of representation, the social structure, the socio-economic reforms, the actors and the mobilizations, ideology, and culture. The global Latin American, considering the variety of the region, and Chilean reality.
4-5 units, Win (Moullan)

20. Latin America in World Politics — Analysis of Latin America's role in world politics with emphasis on U.S.-Latin American relations. History of U.S.-Latin American interactions; importance of national interest in the definition of the U.S.-Latin American relations; and alternative models for explaining U.S.-Latin American relations. Latin America's evolving relationship in the international system. Broad patterns and relationships which go beyond specific events.
4-5 units, Win (Rojas)

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), all closely linked to social problems. Consequences of human action on the environment and possible actions to reverse the situation. DR:6(8)
5 units, Aut (Hajek)

113X. Democratic Consolidation in Latin America: The Southern Cone — (Same as Political Science 113X, Latin American Studies 121X; also listed as International Relations Cluster A.) Provides the political and historical perspectives needed to analyze processes of democratic consolidation in Southern Cone countries. Conceptual approach compares processes of democratic consolidation and surveys relevant political actors.
5 units, Aut (Wilhelmy)

118W. Traditional Cultural Meaning within Latin American Societies — (Same as Sociology 118W, Latin American Studies 126X.) Cultural meanings rooted in Latin American traditional societies, with emphasis on how Latin American people traditionally conceive power and politics, social hierarchy, the state institution, race, and work and economics. A cultural setting of these realms from a historical perspective, from the Spanish Conquest. National differences insofar as they stand as radical exception to general cultural trends.
5 units, Aut (Barros)

120X. Modernization and Culture in Latin America — (Same as Latin American Studies 120X, Anthropology 104X, Spanish 290Z; also listed as International Relations Cluster B.) The intellectual and cultural expressions of Latin America against the background of modernization. Latin American modernization as a constant tension between rationalization and subjectification, between change and identity preservation, and between the logic of economic development and the logic of the culture. DR:9(5)
5 units, Aut (Subercaseaux)

124X. The Transformation of the Global Economy and its Implications for Latin American Growth — (Same as Economics 124X, Latin American Studies 125X; also listed as International Relations Cluster C.) Five basic characteristics and trends of Latin American economies and their importance in the global economy. World trends, such as European integration, technological revolutions, and developmental support to the Third World.
5 units, Aut (Hachette)

158S. Theater and Society — (Same as Drama 158S, Latin American Studies 127X.) The creation, production, and communication of Chilean theater viewed in its close 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 affect 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.
5 units, Aut (Hurtado)

160X. Core Seminar: The Study of Cultural Change — (Same as Latin American Studies 160X.) Provides students the intellectual depth and background to carry out research in the field and to
expose students doing their first extensive research project to the environment of functioning research groups.

5 units, Win (Brunner, Subercaseaux)

161X. Core Seminar: Political Economy of Higher Education and Human Resource Development — (Same as Latin American Studies 161X.) 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 (Brunner)

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)

SPANISH LANGUAGE PROGRAM

11. Oral and Written Spanish for Foreigners: Level I — (Same as Spanish 11.) Instituto de Letras, Catholic University of Chile.

5 units, Aut (Staff)

12. Oral and Written Spanish for Foreigners: Level II — (Same as Spanish 12.) Instituto de Letras, Catholic University of Chile.

5 units, Aut (Staff)

201. Oral and Written Spanish for Foreigners: Level III — (Same as Spanish 201.) Instituto de Letras, Catholic University of Chile.

5 units, Aut (Staff)

PHILOSOPHY

Emeriti: (Professors): Stuart Hampshire, Georg Kreisel, David S. Nivison, Patrick Suppes, James O. Urmson
Chair: Fred Dretske
Director of Graduate Study: John Dupré
Director of Undergraduate Study: Marleen Rozemond

Professors: Michael Bratman (on leave Autumn, Winter), Fred Dretske, John Etchemendy, Solomon Feferman, Dagfinn Follesdal (Spring), Wilbur Knorr, Grigori Mints, Julius Moravcsik (on leave Autumn), John Perry, Johan van Benthem (Spring), Thomas Wasow

Associate Professors: John Dupré, Eckart Förster
Assistant Professors: Rachel Cohon (on leave Winter, Spring), Peter Godfrey-Smith (on leave Spring), Yair Guttmann, Philip J. Ivanhoe, Philip Kremer, Ariela Lazar, Marleen Rozemond, Debra Satz

Courtesy Professor: Denis Phillips
Lecturers: Carlos Colombetti, Brad Wilburn
Acting Assistant Professor: Houston Smit

Consulting Associate Professors: David Israel, C. Raymond Perrault, Brian Smith
Visiting Professors: Alan Code (Spring), Rosalind Hursthouse (Winter), Frances Kamm (Spring), Wolfgang Welsch
Visiting Assistant Professor: Peter de Marneffe (Winter, Spring)
Acting Instructors: Jehanne Anabtawi, Jacqueline Scott

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.

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.

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 out 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
   c) One undergraduate philosophy seminar from the 194 series.
   d) 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 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 core courses must be completed with a letter grade by the end of the junior year:
   a) Philosophy: one from 57, 159, 160A, 169
   c) Philosophy 60
   b) Philosophy 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.

**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 letter grade indicator (LGI), 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) Philosophy 80
   b) 16 units, including at least one course from each of the following areas:
      1) Logic and philosophy of science: Philosophy 57, 60, 61, 156, 159, 160A, 162-169
      2) Ethics and value theory: Philosophy 170-173
      3) Epistemology, metaphysics, and philosophy of language: Philosophy 180-188
      4) History of philosophy: 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 the Graduate Degree Progress Section of the 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 LGI 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).
   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: (1) 80, (2) 160A, and (3) 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.
ods (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 inappropriately 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) 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 1a
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 l(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 LGI 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 five areas:
      1) Logic
      2) Philosophy of science and history 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 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 will 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 390A, 391A, 392A, 393A.
   d) At least one additional seminar in the general area of symbolic systems: that is, Philosophy 289, 326, 396, 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 227.

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**

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 a Cultures, Ideas, and Values sequence, sponsored by the Department of Philosophy as part of the Program in Cultures, Ideas, and Values. Any one of 5A,B,C may count as the introductory philosophy course requirement for the major.

5A,B,C. Philosophy and Human Existence — The philosophical roots of Western culture with some comparison/contrast to Chinese thought. Central theme: the way in which humans' understanding of themselves and their relation to the world affects the organization of society and individual lives. Subtheme: how these understandings shape and are shaped by conceptions of gender, race, and social class.

5A. Cultures, Ideas, and Values: Philosophy and Human Existence, Classical Foundations — Recommended for entering students. Orientation to philosophic argument and themes. Origins of philosophical thought traced in Greek and Chinese classical periods and situated within other forms of understanding. Readings: Homer, Plato, the Bible, Mencius, Aristotle, Aquinas, Averroes, Descartes. DR:1 (three-quarter sequence.)

5B. Cultures, Ideas, and Values: Philosophy and Human Existence, the Enlightenment and its Shadow — Major western scientific, philosophical, and political ideas of the 17th and 18th centuries. The origins of notions of gender in antiquity and gender issues embedded in Enlightenment thought. The exclusion of non-Europeans from, and the place of slavery within, Enlightenment ideals such as liberty and equality. Readings: Copernicus, Douglass, Galileo, Hobbess, Jacobs, Locke, Mill, Newton, de Pizan, Rousseau, Wollstonecraft, and Native American narratives. DR:1 (three-quarter sequence)

5C. Cultures, Ideas, and Values: Philosophy and Human Existence, the Present Age — 19th- and 20th-century contributions to philosophy of science and to moral and political philosophy which have significantly shaped the intellectual and political movements of the present age. The positive and negative aspects of these developments. Readings: Darwin, Marx, Freud. DR:1 (three-quarter sequence)

**PHILOSOPHY 615**

The nature of human being, of morality, and of the world. Western conceptions of the soul from the Greeks to Descartes. Readings: Homer, Plato, the Bible, Mencius, Aristotle, Aquinas, Averroes, Descartes. Recommended for entering students. DR:1 (three-quarter sequence.)

5 units, Aut (Staff) MW 9

plus two 90-minute sections

5B. Cultures, Ideas, and Values: Philosophy and Human Existence, the Enlightenment and its Shadow — Major western scientific, philosophical, and political ideas of the 17th and 18th centuries. The origins of notions of gender in antiquity and gender issues embedded in Enlightenment thought. The exclusion of non-Europeans from, and the place of slavery within, Enlightenment ideals such as liberty and equality. Readings: Copernicus, Douglass, Galileo, Hobbess, Jacobs, Locke, Mill, Newton, de Pizan, Rousseau, Wollstonecraft, and Native American narratives. DR:1 (three-quarter sequence)

5 units, Win (Staff) MW 9

plus two 90-minute sections

5C. Cultures, Ideas, and Values: Philosophy and Human Existence, the Present Age — 19th- and 20th-century contributions to philosophy of science and to moral and political philosophy which have significantly shaped the intellectual and political movements of the present age. The positive and negative aspects of these developments. Readings: Darwin, Marx, Freud. DR:1 (three-quarter sequence)

5 units, Spr (Staff) MW 9

plus two 90-minute sections

10. God, Self, and the World — The basic concepts, methods, and problems of Western philosophy. The nature and existence of God, minds, and the physical world are approached through contemporary and classical philosophical texts. DR:8(3)

5 units, Win, Spr (Lazar) MWF 10

plus section


5 units, Aut (Cohon) MWF 11 plus section

30. Introduction to Political Philosophy — (Same as Public Policy 103A.) Introduction to some funda-
mental issues of political life. Why do laws have authority? Can it be fair for some people to be wealthier than others? How free should society be? Do we need a government at all? Questions explored through a careful reading of the classic texts in political philosophy, from the 4th century B.C. to the present. DR:8(3)

5 units, Win (Satz) MWF 11 plus section

41. Eastern and Western Conceptions of Self—(Same as Religious Studies 1E.) Analysis and comparison among models of the self in various traditions, notably classical Greek, Christian, Confucian, Buddhist, Taoist, and Freudian. Limited enrollment. DR:2(*) or 8(3*)

5 units (Yearley) not given 1994-95

42. Philosophy of Religion—(Same as Religious Studies 42.) Classic and modern questions in 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. DR:8(3)

5 units, Aut (Gelber) MWF 11

46. Introduction to Chinese Thought—(Same as 104, Asian Languages 46, 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. DR:2(*) or 8(3*)

4 units, Spr (Ivanhoe) MWF 10

57. Logic, Reasoning, and Argumentation—Study of propositional and predicate logic, emphasizing translating English sentences into logical symbols and constructing derivations of valid arguments. 5 units, Aut, Spr (Kremer) MTWThF 9

60. Introduction to the History and Philosophy of Science—(Same as History and Philosophy of Science 60.) Positivism, Popper, and the old "received view" of scientific theories; problems involving explanation and induction; Kuhn and subsequent attempts to rebuild moderate empiricist positions; case study in the dispute between early geneticists and Darwinians, and the inauguration of modern evolutionary theory. DR:8(3*)

5 units, Aut (Gutmann) MWF 1:15

61. Introduction to the Philosophy of Social Science—(Same as Education 111.) For upper-division undergraduates majoring in the social sciences and beginning graduate students in related areas such as education. Focuses on differences writers have noted between the natural and social sciences, and topics of importance in the social sciences: explaining human action, the functional explanation of social phenomena, and holistic vs. reductionist orientations. Examples from contemporary social science research literature.

3 units, Aut (Phillips) T 7-9:30 p.m. alternate years, not given 1995-96

77. The Ethics of Social Decisions—(Same as Ethics in Society 77.) Do adults have a moral right to do what they like as long as no one is harmed? Philosophical discussions of the general right to liberty, focusing on the question of whether adults have a moral right to use drugs (cocaine and heroin) for pleasure.

4 units, Win (de Marneffe) MWF 1:15

78. Medical Ethics—(Same as Human Biology 173.) Introduction to ethical theory. Topics: models of the doctor-patient relation, confidentiality, informed consent, abortion, euthanasia, criteria for death, distribution of scarce medical resources, genetic manipulation.

4 units, Spr (Kamm) TTh 1:15-2:30

80. Mind, Matter, and Meaning—Intensive survey of some central and perennial topics in philosophy: free will and determinism, the mind-body problem, theory of knowledge, and personal identity. Writing focus course. Prerequisite: one course in philosophy other than logic. DR:8(3)

5 units, Aut (Dretske) MWF 11

Spr (Bartman) MW 1:15-2:30

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—The philosophies of Plato and Aristotle, with some pre-Socratic background. DR:8(3)

4 units, Spr (Code) TTh 11-12:15


4 units (Gelber) not given 1994-95

102. Modern Philosophy, Descartes to Kant—Examination of various epistemological and metaphysical issues in the works of Descartes, Leibniz, Locke, Berkeley, Hume, and Kant. The origins and scope of human knowledge, substance, causation, mind-body dualism, and the role of God in a philosophical system. DR:8(3)

4 units, Win (Perry) MWF 2:15
103. 19th-Century Philosophy — Ideas and conceptions that shaped 19th-century philosophy. Fichte, Hegel, Marx, Kierkegaard, Nietzsche.
4 units (Forster) not given 1994-95

104. Introduction to Chinese Thought — (Same as 46.) For philosophy majors.

113/213. Zhuang Zi — (Graduate students register for 213; same as Asian Languages 113, Religious Studies 113.) 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 required. Separate readings for those who know Classical Chinese. Prerequisite: 46 or consent of instructor.
5 units (Ivanhoe) not given 1994-95

114/214. Neo-Confucianism — (Graduate students register for 214; same as Asian Languages 231, Religious Studies 119A.) Introduction to later Confucian thought as represented in the Song through Qing dynasties. 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: 46 or consent of instructor.
4 units (Ivanhoe) not given 1994-95

116/216. Plato's Philosophy — (Graduate students register for 216.) The development of Plato’s metaphysical theories.
4 units, Win (Moravcsik) MW 1:15-2:30

119. Hellenistic Philosophy — (Enroll in Classics 165.)
4 units, Aut (Wigodsky) MWF 10

120/220. Aquinas' Ethics — (Graduate students register for 220; same as Religious Studies 273.) 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 1994-95

121/221. Descartes — (Graduate students register for 221.) Descartes's philosophy is fundamental to modern Western thought. His views, focusing on mind-body dualism. Descartes's novel way of distinguishing between the corporeal and the incorporeal. Why he adopted his form of dualism and various problems for this view. Related questions about science, religion, and knowledge.
4 units, Spr (Rozemond) TTh 1:15-2:30

125A/225A. Kant's Critique of Pure Reason — (Graduate students register for 225A.) In-depth study of Kant's greatest work with selected secondary literature.
4 units, Aut (Forster) TTh 11-12:15

125B/225B. Kant's Second Critique — (Graduate students register for 225B.) Historical and systematic study of Kant’s ethics and philosophy of religion, with emphasis on Kant’s second Critique.
4 units (Forster) not given 1994-95

125C/225C. Kant's Third Critique — (Graduate students register for 225C.) Focuses on the contrast between reflecting and determining judgment.
4 units, Spr (Smit) TTh 11-12:15

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 (Godfrey-Smith) not given 1994-95

130/230. Kierkegaard — (Graduate students register for 230; same as Religious Studies 274C.) Soren Kierkegaard’s major works: Either/Or, Philosophical Fragments, The Concluding Unscientific Postscript, The Sickness Unto Death, Works of Love, and Purity of Heart is to Will One Thing. How do Kierkegaard’s views on human nature and freedom bear on his understanding of God and the good life? How do his views on dread and despair relate to the intellectual climate of his times? Does his authorship (pseudonymous and nonpseudonymous) present a unified cosmology, or is it an elaborate poking-fun at anything resembling metaphysics, epistemology, ethics?
5 units (Harvey) not given 1994-95

131/231. The Structure of Cognition: Introduction to Husserl’s Phenomenology — (Graduate students register for 231.) Its background and basic concepts. Emphasis on the concept of intentionality, and its role in Husserl’s theory, and in contemporary philosophical debates.
3 units (Follesdal) not given 1994-95

132/232. Existentialism — (Graduate students register for 232.) Heidegger’s and Sartre’s existentialisms, based on close reading of parts of Being and Time, Being and Nothingness, and Sartre’s novels and plays. The historical background of existentialism, notably in Kierkegaard and Husserl, and the relation between the existentialist ideas, politics, literature, and the arts.
4 units, Spr (Follesdal) TTh 3:15-4:30

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, Win (Förster) TTh 11-12:15
134. Reason Today — Its Contemporary Criticism and an Alternative Concept of Reason—Recent critiques of reason (Horkheimer, Adorno, Heidegger, Habermas, Foucault, Vattimo, Derrida, Lyotard, Deleuze, Rorty, Wittgenstein, etc.) and a "transversal" concept of reason.
4 units, Win (Welsch) MW 11-12:15

135/235. Concepts of Culture— (Graduate students register for 235.) Traditional concepts of culture used to be unifying concepts, based on ethnic, national, or political unity. The structure of modern societies is characterized by a plurality of internal forms of life and by connections transcending traditional borders. What kind of concept could be adequate for contemporary societies?
4 units, Aut (Welsch) MW 11-12:15

HISTORY OF SCIENCE
138A. Ancient Period— DR:8(3)
4 units, Aut (Knorr) MWF 2:15
138B. Cosmology: Middle Ages and the Renaissance— DR:8(3)
4 units, Win (Knorr) MWF 2:15
138C. Modern Period: Newton to Einstein— DR:8(3)
4 units, Spr (Knorr) MWF 2:15

140. Topics in the History of Mathematics: From Antiquity to the 17th Century— (Same as History 138D, History and Philosophy of Science 140.) Origins and development of concepts and techniques in their social and philosophical context. Emphasis 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, Win (Knorr) TTTh 2:15-3:30

145/245. Scientific Revolution— (Graduate students register for 245; same as History 139, History and Philosophy of Science 145/245.) 17th-century philosophy and science; the development of science from Descartes to Newton. Emphasis is on basic physical concepts (space, matter, force, inertia, etc.), celestial mechanics, scientific method, and the interplay between science and religion.
4 units, not given 1994-95

152. The Darwinian Revolution— (Same as History 133; History and Philosophy of Science 152; Human Biology 152; Science, Technology, and Society 130.) Conceptual developments leading to establishment of the major unifying paradigm of biological science, the theory of evolution by natural selection. Biological thought before Darwin, 1750 to 1836. Formation of Darwin's thought in terms of its broader intellectual and social context; the Origin of Species. Difficulties the theory had to overcome and their resolution in the union of evolutionary biology and population genetics. DR:9(4)
4 units (Lenoir) not given 1994-95

LOGIC AND PHILOSOPHY OF SCIENCE
156. Popper, Kuhn, and Lakatos— (Same as Education 214X.) Popper, Kuhn, and Lakatos are 20th-century philosophers of science who have 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 1994-95

159. Basic Concepts in Mathematical Logic— (Same as Linguistics 135.) 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.
DR:4(6)
4 units, Aut (Wasow) MWF 9

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 Löwenheim-Skolem Theorem and the Compactness Theorem. Prerequisite: 159 or consent of instructor. DR:4(6)
4 units, Win (Kremer) MWF 9 plus section

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 (Mints) MWF 9 plus section

161. Set Theory— (Enroll in Math. 161.)
3 units, Spr (Ratner) TTTh 3:15-4:30

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 lead-
163. Philosophy of Statistics — Introduction to and definition of the concept of probability in a philosophically motivated fashion. Emphasis on the use of probabilities for decision-making under uncertainty.
4 units (Guttmann) not given 1994-95

164/264. Central Topics in the Philosophy of Science — (Graduate students register for 264.) Intermediate-level treatment of some fundamental issues in the philosophy of science. Possible topics: explanation, confirmation and induction, theory change, the structure of theories, causation, realism, theory and observation, reductionism and the unity of science.
4 units, Aut (Dupré) TTh 1:15-2:30

165/265. Philosophy of Physics — (Graduate students register for 265.) Methodological and philosophical issues in modern physics.
4 units, Spr (Guttmann) T 2:15-5:05

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, Win (Godfrey-Smith) TTh 11-12:15

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 (Kremer) W 3:15-5:05

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: partiality, dynamics, type structure.
4 units, Spr (van Benthem) MW 1:15-2:30

ETHICS, AESTHETICS, AND SOCIAL AND POLITICAL PHILOSOPHY

170. Ethical Theories — The ethical theories of Aristotle, Kant, and Mill; modern versions of these theories and recent debates about them.
4 units, Win (Hursthouse) MW 11-12:15

171. Political Philosophy — Highlights of the rebirth of liberal political theory in the last 25 years, with emphasis on the concerns of liberalism's critics. Topics: Rawlsian liberalism, libertarianism, communitarianism, and feminism. The question of special rights for ethnic minorities, and the question of secession.
4 units, Spr (Satz) MW 3:15-4:30

172/272. Topics in Moral Philosophy — (Graduate students register for 272.) Moral realism and antirealism. Theories asserting the objective reality of moral values, and challenges to such theories, including moral subjectivism, relativism, and noncognitivism. Mainly 20th-century articles by Blackburn, Hare, Harman, Mackie, McDowell, Railton, and Williams.
4 units (Cohon) not given 1994-95

174/274. Hume's Moral and Political Philosophy — (Graduate students register for 274.) David Hume's ethics and political philosophy, emphasizing historical context and relevant debates today. Possible topics: reason and motivation, the rationality of moral conduct, virtue and sentiment, the nature and conditions of moral judgment, "artificial" virtues, how promises obligate, the origins of the state. Prerequisite: one course in moral philosophy.
4 units, Aut (Cohon) Th 2:15-5:05

174A. Morality of Peace and War — (Same as Religious Studies 164.) Moral, political, and religious issues surrounding conflict and conflict-resolution, especially in a nuclear age. General nature of peace and war, their theory and practice, just war tradition, pacifism, women and war. DR:8(3)
5 units (Jackson) not given 1994-95

174B. Skepticism and Morality — (Same as Religious Studies 272.) Meta-ethics. What is the nature and justification of moral truth claims? What, if anything, makes a person virtuous and an action valuable? Three general positions: foundationalism, pragmatism, skepticism. Authors: Aquinas, Gewirth, Hume, Kierkegaard, Nagel, Rorty, and Stout.
5 units (Jackson) not given 1994-95

175C. Feminist Political Theory: Gender Power and Justice — (Enroll in Political Science 154, Feminist Studies 138.)
5 units, Aut (Okin)

175D/275D. Contemporary Theories of Justice — (Enroll in Political Science 268.)
5 units, Win (Okin)

176A. Current Questions in Aesthetics — Should aesthetics be limited to questions of the arts? Could aisthesis be a new focus? What about aesthetics outside aesthetics? What about media aesthetics?
3 units, Win (Welsch) Th 1:15-3:05
177. Anti-Racism, Multi-Culturalism, and Common Humanity — The philosophical and political consequences of heterogeneity and racial division in contemporary U.S. politics. How can we balance a recognition of, and attachment to, different cultures with respect for our common humanity? What laws, values, and political arrangements best embody this balance? What are the appropriate remedies to the legacies of racism and injustice? Topics: racism, multiculturalism, cultural pluralism, assimilation, and affirmative action.

4 units, Win (Satz) MW 3:15-4:30

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 instructors. Student-prepared reading list made available a week prior to the presentation. Group discussion follows.

3 units, Win (de Marneffe) W 3:15-5:05

179. Philosophy of Friendship

4 units, Win (Moravesik) TTh 1:15-2:30

EPISTEMOLOGY, METAPHYSICS, PHILOSOPHY OF MIND, AND PHILOSOPHY OF LANGUAGE

Philosophy 80 or consent of instructor is a prerequisite for the 180 series.

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. DR:9(4)

4 units, Spr (Kremer) MWF 2:15-3:30

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. Recommended: some acquaintance with the philosophy of language.

4 units (Føllesdal) not given 1994-95

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.

4 units, Win (Dretske) MWF 10

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.

4 units, Aut (Lazar) MW 2:15

187. Freud — Sigmund Freud's psychoanalysis, a revolutionary approach towards the nature of self-understanding, a person's deepest passions, the ends of life, and the nature of mind. The evolution of Freud's thought and key concepts in Psychoanalytic Theory, including the unconscious, sexuality, and repression. Freud's views of human culture and the nature of his scientific project.

4 units, Spr (Lazar) MW 11-12:15

194. Undergraduate Seminars in Philosophy — Preference given to undergraduate majors. A series of advanced undergraduate seminars. Enrollment limited to 16 in each seminar. For those in the Philosophy honors program, seminars serve as preparation for writing an honors thesis.

194A. Aquinas — Discussion of how Aquinas tries to fit an Aristotelian metaphysics into a neo-Platonic metaphysics.

4 units, Aut (Smit) Th 2:15-5:05

194B. Early Modern Conceptions of Human Nature — Classical conceptions of human nature (mind-body dualism, rationality, the contrast between nature and culture). The role of these issues in early modern conceptions of non-European cultures and women. Readings: Montaigne, Descartes, Las Casas, Garcilaso de la Vega, Jean de Lery, Poullain de la Barre, Mary Wollstonecraft.

4 units, Win (Rozemond) Th 2:15-5:05

194C. Fichte's Philosophy

4 units, Spr (Forster) Th 2:15-5:05

196. Tutorial — Senior Year

5 units, any quarter (Staff) by arrangement

197. Individual Work for Undergraduates

any quarter (Staff) by arrangement

PRIMARILY FOR GRADUATE STUDENTS

Graduate students should also consult previous entries in the catalog for courses with graduate student numbers.

211. Philosophical Texts of the Ming Dynasty — (Same as Asian Languages 232, Religious Studies 211.) Primary text: Huang Zongxi's Mingruxuean, a history of Ming Dynasty philosophers. Focuses on structure and theory of organization and approach to text. Additional readings from Wang Yangming and Li Zhi. Prerequisite: reading knowledge of classical Chinese.

5 units (Ivanhoe) not given 1994-95

212. Interpreting Confucian Texts — (Same as Asian Languages 230, Religious Studies 212.) Illustrates 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, Spr (Ivanhoe) MW 2:15-4:05

methodology, essential and accidental predication, substance, general ontology, hylomorphic analysis, and the distinction between actuality and potentiality.

3 units, Spr (Code) W 10-12
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) by arrangement
240. Individual Work for Graduates
any quarter (Staff) by arrangement
242A. Philosophy of Science Seminar: Foundations of Quantum Mechanics
3 units, Aut (Suppes) M 3:15-5:05
242B. Philosophy of Science Seminar: Causality
3 units, Win (Suppes) M 3:15-5:05
242C. Philosophy of Science Seminar: Foundations of Statistical Mechanics
3 units, Spr (Suppes, Guttmann) M 3:15-5:05
244. Evolutionary Perspectives on Cognitive Science — Examination of the relevance of key evolutionary concepts for cognitive science, focusing on the concept of adaptation. Recent work on complexity and evolution. Recommended: basic understanding of philosophy of mind.
3 units (Godfrey-Smith) not given 1994-95
260. Core Seminar in Philosophy of Science — For first- and second-year students in the Philosophy Ph.D. program.
4 units, Aut (Godfrey-Smith) MW 3:15-5:05
263. Graduate Seminar on Freedom of the Will
3 units, Aut (Dupré) W 1:15-3:05
270. Core Seminar in Moral Philosophy — For first- and second-year students in Philosophy Ph.D. program.
4 units, Aut (Godfrey-Smith) MW 3:15-5:05
273. Topics in the Philosophy of Economics
4 units, Spr (Dupré, Satz) Th 10-12
275. Graduate Seminar in Political Philosophy: Marx and Recent Marxism — Considers the distinctive contributions of Marx’s theory with reference to recent work in analytical philosophy. Marx’s theory of history and theory of capitalism. Emphasis is on Capital and contemporary texts.
3 units (Satz) not given 1994-95
3 units (Bratman) not given 1994-95
278. Graduate Seminar in Applied Ethics — Interdisciplinary. Faculty and students present issues of public and personal morality, topics chosen with the advice of instructor. Student-prepared reading list is available to class a week prior to presentation. Group discussion follows.
3 units, Spr (de Marneffe) M 10-12
279. Virtue Ethics — Ethical philosophy as found in the writings of Aristotle, Philippa Foot, Elizabeth Anscombe and John McDowell; its relation to Kantianism and utilitarianism.
3 units, Win (Hursthouse) T 3:15-5:05
280. Core Seminar in Metaphysics and Epistemology — For first- and second-year students in the Philosophy Ph.D. program.
4 units (Dupré) not given 1994-95
281. Core Seminar in Philosophy of Language — For first- and second-year students in the Philosophy Ph.D. program.
4 units, Spr (Perry) MW 3:15-5:05
282. Causation in Early Modern Philosophy — Nature of causation: questions about causal interaction between bodies and incorporeal minds and the possibility of causal activity among bodies or among created things in general. The views of major thinkers on this issue (Descartes, Locke, Malebranche, Leibniz, Hume).
3 units, Aut (Rozemond) T 3:15-5:05
284. Rationality — Relation between norms of rationality and understanding the behavior of persons. Analysis of rational models, in which psychological explanations of belief acquisition and action are firmly grounded, and psychological reality. Is the attribution of beliefs constrained by standards of rationality and is attribution of emotions governed by such constraints? Normative nature of rationality and its relation to other normative concepts.
3 units, Win (Lazar) M 3:15-5:05
285. Intentionality — Intentionality and the issues connected with it in philosophy of mind, philosophy of language, logic, action theory, ethics, and metaphysics. Recent attempts to develop a systematic approach to intentionality. Readings on recent articles.
3 units, Spr (Føllesdal) T 10-12
290A. Model Theory — (Enroll in Math. 290A.)
291 A,B. Recursion Theory
3 units, Aut, Win (Feferman) TTh 2:15-3:30
292A,B. Set Theory — (Enroll in Math. 292A,B.)
3 units, Spr (Perry) MW 3:15-4:30
294. Topes in Logic — (Enroll in Math. 294.)
3 units, Spr (Mints) Th 1:15-3:05
3 units (Etchemendy) not given 1994-95
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 algebra), categorical structures (quantification, polymorphism).

3 units, Spr (van Benthem) F 10-12

304. The Philosophical and Educational Thought of John Dewey—(Same as Education 304.) Analysis of important works of John Dewey. Readings vary each year. Emphasis may be on an epistemology or social philosophy together with educational philosophy.

4 units (Noddings) not given 1994-95

314. Advanced Classical Chinese Texts—(Same as Religious Studies 314.)

4 units, Aut (Ivanhoe) Th 10-12

322. Leibniz—Analysis of Leibniz' philosophical system with an emphasis on his metaphysics.

3 units (Rozemond) not given 1994-95

373. Philosophy of Social Science

3 units, Spr (Braiman, Ferejohn) T3:15-5:05

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 1994-95

381. Seminar in Philosophy of Language: Language and Thought—Two competing conceptions of the relationship between language and thought. Chomskians and neo-Fregeans like Evans and McDowell favor thoughts over language. Dummett and neo-Russellians like Kaplan favor language over thought. Readings from the above authors and others.

2 units, Aut (Staff) M 12:15-2:05

382. Seminar in Philosophy of Language: Syntax

3 units, Spr (Moravescik) Th 3:15-5:05

383. Epistemology—Examination and comparison of Hume and Goodman on induction, and Wittgenstein on following a rule.

3 units, Win (Dupre, Godfrey-Smith) T 1:15-3:05

395A. Philosophy of Computation—Examination of the conceptual foundations of computation focusing on: formal symbol manipulation, recursive function theory, effective computability, digital state machines, and information processing. Non-standard views also considered: e.g., connectionism and non-linear dynamics. The general role of computational metaphors in intellectual life. Readings: Dretske, Dreyfus, Fodor, Goodman, Haugeland, Newell, Simon, Smith, Turing, and others.

3 units, Win (Smith) TTh 10-11:30

395B. Philosophy of Cognitive Science—A foundation analysis of modern cognitive science, emphasizing the role of computation. Topics: traditional symbol manipulation (Fodor, Haugeland, Newell, Pylyshyn, Simon); full-scale critiques (Dreyfus, Searle, Taylor, Winograd); the role of connectionism (Cussins, Fodor, Smolensky); and anti-representationalism (Brooks, Chapman, Dretske, Rosenschein).

3 units, not given 1994-95

450. Thesis

any quarter (Staff) by arrangement


Chair: Douglas D. Osheroff

Director of Graduate Study: Robert V. Wagoner

Director of Undergraduate Study: Mason R. Yearian


Associate Professors: Patricia Burchat, Peter F. Michelson, Shoucheng Zhang

Assistant Professors: Mark A. Kasevich, Charles M. Marcus, Roger W. Romani

Professors (Research): John A. Lipa, Todd I. Smith, John P. Turneaure

Acting Professor: Mark I. Dykman

Consulting Professors: Theodor W. Hansch, Marc D. Levenson, Stephen Libby, Melvin Schwartz

By Courtesy: Peter A. Sturrock, Richard Taylor, Richard N. Zare

OFFERINGS AND FACILITIES

The Russell H. Varian Laboratory of Physics, the adjacent Physics Lecture Hall, and 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 laboratory.
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 Yearian is director of HEPL, and Professors Cabrera, Lipa, Michelson, Schwettman, Smith, and Turneaure are members of the laboratory. The staffs of Ginzton Laboratory, SLAC, and SSRL are listed in the “Independent Research Laboratories, Centers, and Institutes” section of this bulletin.

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.

The number of graduate students admitted to the Department of Physics has more detailed information.

### 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, 107, 110, 111, 120, 121, 122, 130, 131, 132, 170, 171, 201, 202; and Math. 41, 42, 43, 44, 130, 131, and any one additional math course numbered 100 or higher. Physics 51, 53, 54, 55, and 56, can replace the Physics 60 series requirements. One additional physics course at the senior level is required and may be selected from Physics 135, 160, 161, 172, 181, 192 or 262, 204. 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; some Computer Science, for example, 106; and also the study of a modern language. Mathematics and physics courses taken to satisfy the department's major requirements cannot be taken on a +/No Credit basis.

Students may follow either of the two course sequences. Sequence I (based on Physics 61, 63, and 65) is preferable for students who have had physics and some calculus in high school. In this sequence, Math. 41 is not required. Sequence II (based on Physics 51, 53, and 55) is mainly for students who have a lesser background in science and mathematics. Students contemplating a major in physics are urged to consult with the instructor of Physics 61 at the earliest possible date to see which sequence is the most suitable.

Students who enter the physics program after the freshman year are normally advised to take the Physics 61, 63, 65 sequence, provided they have previously taken Math. 41.

Sample programs in physics and mathematics under the two sequences are shown below. Students should consult their advisers about the course distribution requirements in other areas. Students should work out, in consultation with their advisers, a program which best fulfills individual aims. The Undergraduate Office of the Department of Physics has more detailed informa-
information on how to obtain a B.S. degree in physics. This should be carefully studied by prospective majors, especially if they intend to make use of Stanford's programs abroad. Under some circumstances the department permits, by petition, flexibility in the requirements so that the student may fit a period abroad into the program. Those students who enter the program through the 50s series and who have completed Math. 44 or 130 should consider including the intermediate labs (Physics 105 and 107) or intermediate electricity and magnetism (120 series) in their program in their sophomore year.

### SEQUENCE I

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<th>Course No. and Subject</th>
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<td>Math. 42, 43, 44. Analytic Geometry, Calculus</td>
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<td>Physics 61, 63, 65. Advanced Freshman Physics</td>
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<td>Physics 64, 66. Advanced Freshman Laboratory</td>
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<th>SECOND YEAR*</th>
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<tbody>
<tr>
<td>Math. 130, 131, 132. Ordinary Differential Equations, Partial Differential Equations I and II</td>
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<td>Physics 70. Modern Physics</td>
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<td>Physics 105, 107. Intermediate Physics Laboratories</td>
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<td>Physics 110, 111. Intermediate Mechanics</td>
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<td>Physics 120, 121, 122. Intermediate Electricity and Magnetism</td>
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<th>THIRD YEAR*</th>
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<tr>
<td>Math. 103, 106, or 109. Linear Algebra and Matrix Theory, Complex Variables or Modern Algebra</td>
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<td>Physics 130, 131, 132. Quantum Mechanics</td>
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<td>Physics 160, 161. Introduction to Galactic Astrophysics, Extragalactic Astrophysics</td>
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<td>Physics 170, 171, 172. Thermodynamics, Kinetic Theory and Introduction to Statistical Mechanics, Physics of Solids</td>
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<td>Physics 181. Optics</td>
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<td>Physics 192. Introductory Biophysics</td>
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<td>Physics 201/202. Advanced Physics Laboratories</td>
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<td>Physics 262. Essential General Relativity</td>
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<tr>
<td>Physics 135. Computational Physics</td>
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<td>Physics 203. Advanced Physics Laboratory</td>
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<td>Physics 204. Senior Seminar in Theoretical Physics</td>
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<td>Physics 205. Honors Program</td>
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| Physics 210, 211, 212. Advanced Mechanics (Partical and Continuum, Nonlinear Statistical) | t3 | t3 | t3 |
| Physics 220, 221. Classical Electrodynamics | t3 | t3 | |

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<th>SEQUENCE II</th>
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<tr>
<td>FIRST YEAR*</td>
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<tr>
<td>Math. 41, 42, 43. Analytic Geometry and Calculus</td>
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<td>Physics 51, 53. Mechanics, Electricity, Magnetism</td>
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<td>Physics 54. Electricity, Magnetism, Laboratory</td>
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<tr>
<td>Math. 44, any additional math course numbered 100 or higher</td>
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<tr>
<td>Math. 130, 131, 132. Ordinary Differential Equations, Partial Differential Equations I and II</td>
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<td>Physics 55. Light and Heat</td>
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<td>Physics 56. Light and Heat Laboratory</td>
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<td>Physics 70. Modern Physics</td>
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<td>Physics 110, 111. Intermediate Mechanics</td>
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<td>Physics 192. Introductory Biophysics</td>
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<td>Physics 202, 203. Advanced Physics Laboratory</td>
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<td>Physics 210, 211. Advanced Mechanics, (Particle and Continuum, Nonlinear)</td>
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<td>Physics 262. Essential General Relativity</td>
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* Additional elective units must be added to bring the total number of units to 180 as required by the University.
† Not required for the degree in physics.
** Majors are required to take one of these courses.

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.

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 announced publicly and is open to the general audience. 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 “Advanced 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 an average letter grade indicator (LGI) 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, etc.) are discussed in the “Advanced 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.

All Ph.D. candidates must have math proficiency equivalent to the following courses: 106, 113, 114, 130, 131, 132. An average LGI of at least ‘B’ is required in all the courses taken toward the degree.

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 end of September. 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 “Astrology 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

There are four series of beginning courses. The Ten Series (11, 14, 15, 19) 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 Fifty Series (51, 53, 54, 55, 56, 58) 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 Fifty 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 Fifty 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. DR:5(7)

3 units, not given 1994-95

12. Science, Society, and Politics — For sophomores only. Support for scientific research projects with public funds, and who gets those funds is a political issue. Proposed, ongoing, or recently abandoned scientific projects, and public debates on their relevance, importance, and appropriateness as public enterprises. Global warming, ozone depletion, and NASA’s Earth Observing Program. Theories concerning the role of earth-asteroid/comet collisions in the extinction of the dinosaurs, and their danger to contemporary earth. The cancellation of the Superconducting Supercollider, and the proper role of the government in funding fundamental science in the post cold-war era. The proposal to build the Space Station jointly with Russia (does it subordinate science to foreign policy? What is NASA’s role in the post cold-war era?) Should the government support the development of “clean” nuclear power from fusion. What of the continued development of “conventional” nuclear power from fission.

4 units, Spr (Walker) TTh 2:30-3:45


3 units, not given 1994-95

15. Topics in Modern Astronomy — 15 A 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 not take both courses.
15A. The Nature of the Universe—(Enroll in Astronomy 15A.)
3 units, Win (Walker) MW2:15-3:30
15B. Cosmic Horizons—For the non-science student. Possible topics: the physical laws that govern the universe; its evolution traced from the initial primeval fireball; the formation of galaxies, stars, and planets; and the development of life. Exotic astronomical objects, quasars, pulsars, and black holes. Some algebra is used. DR:5(7)
3 units, Spr (Petrosian) MW 1:15-2:30

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. DR:(5)
3 units, Aut (Yearian) MWF 1:15

21. Mechanics and Heat—For biology, social science, pre-medical 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. DR:5(7)
3 units, Aut (Cabrera) MW 10 or 11
one-hour discussion by arrangement

1 unit, Aut (Cabrera) by arrangement

23. Electricity and Optics—Electric charges and currents, magnetism, induced currents; wave motion, interference, diffraction, geometrical optics. Prerequisite: 21. DR:5(7)
3 units, Win (Susskind) MW 10 or 11
one-hour discussion by arrangement

24. Electricity and Optics Laboratory—Pre- or corequisite: 23.
1 unit, Win (Susskind) by arrangement

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. DR:5(7)
3 units, Spr (Cabrera, Romani)
MW 10 or 11 one-hour discussion by arrangement

26. Modern Physics Laboratory—Pre- or corequisite: 25.
1 unit, Spr (Cabrera, Romani)
by arrangement

3 units, Aut (Wagoner) TTTh 11-12:15
discussion by arrangement

28. Mechanics, Heat, Electricity, and Magnetism I—For biology, social science, pre-medical 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. DR:5(7)
6 units, Sum (Gillespie) MTWThF 10-12
plus two hours of discussion by arrangement

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.
6 units, Sum (Gillespie) MTWThF 10-12
plus two hours of discussion by arrangement

49. Physics Problem Solving—Prerequisite: enrolled in the SEMAP courses.
2 units, Aut (Hawthorne-Seairight)
WF 2:15-5

50. Astronomy Laboratory and Observational Astronomy—Theory and use of an 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. DR:5(7)
3 units, Aut, Sum (Walker) M 4:15
lab by arrangement

51. Mechanics—Vectors, particle kinematics and dynamics, work, energy, momentum, angular momentum; conservation laws; rigid bodies, oscillations. Discussions based on use of calculus. Prerequisites: Math. 20 or 41 and continuation in Math. 42, or consent of instructor. DR:5(7)
4 units, Win (Yearian) lec MW 9 or 10
discussions by arrangement
53. Electricity and Magnetism — Electric charges and currents, electric and magnetic fields, capacitance, inductance, resistance. Maxwell’s equations, electromagnetic oscillations and waves. Prerequisites: 51 and Math. 21 or 42, or consent of instructor. DR:5(7)
   4 units, Spr (Osheroff) lec MWF 9 or 10 discussion by arrangement

54. Electricity and Magnetism Laboratory — Pre or corequisite: 53.
   1 unit, Spr (Osheroff) by arrangement

55. Light and Heat — Reflection and refraction of light, lens systems; light and electromagnetic waves; temperature, properties of matter, introduction to kinetic theory of matter. Prerequisites: 53 and Math. 43, or consent of instructor. DR:5(7)
   4 units, Aut (Wojcicki) lec MWF 9 or 10 discussion by arrangement

56. Light and Heat Laboratory — Pre- or corequisite: 55.
   1 unit, Aut (Wojcicki) by arrangement

58. Modern Physics Laboratory — Prerequisite: 25 or 70.
   1 unit, Win (Kasevich) by arrangement

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 DR:5(7)
   61. 4 units, Aut (Zhang) TTh 9-10:50
   63. 4 units, Win (Marcus) TTh 9-10:50
   65. 4 units, Spr (Marcus) TTh 9-10:50

   64. 1 unit, Win (Marcus) by arrangement
   66. 1 unit, Spr (Marcus) by arrangement

70. Modern Physics — Relativity, experimental basis of quantum theory, Schrödinger equation, atomic structure, nuclear structure, high energy physics, elementary particles. Prerequisites: 53. Recommended: prior or concurrent registration in Math. 130. DR:5(7)
   3 units, Aut (Kasevich) TTh 11-12:15

100. Introduction to Observational and Laboratory Astronomy — Introduction to observational techniques in astronomy for physical science or engineering students. Emphasis 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. DR:5(7)
   4 units, Spr (Walker) M 3:15-5 lab by arrangement

105,107. 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. Prerequisites: 54 or 64 and 66; prior or concurrent registration in 56 and the 120 series.

105. Laboratory Seminar I: Electronics
   3 units, Aut (Pam) F 12

107. Laboratory Seminar II
   3 units, Spr (Kasevich) by arrangement

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: 51 or 61, and Math. 130.
   110. 4 units, Win (Kasevich) MWF 9
   111. 4 units, Spr (Michelson) MWF 9

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: 53 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 (Michelson) MWF 11
   121. 4 units, Win (Burchat) MWF 11
   122. 4 units, Spr (Wojcicki) MWF 11

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 (Chu) TTh 1:15-2:30
131. 4 units, Win (Chu) TTh 1:15-2:30
132. 4 units, Spr (Fetter) TTh 1:15-2:30

135. Computational Physics—Development of computational methods with application to problems in classical dynamics, electrodynamics, quantum mechanics, 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. Prerequisites: 110, 111, 121; Math. 130. Offered occasionally.

3 units, not given 1994-95

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 50 series or equivalent.

3 units, Aut (Chu) TTh 1:15-2:30

161. Introduction to Extragalactic Astrophysics and Cosmology—Basic observational data on distances and the distribution of matter in the universe: galaxies, clusters, and superclusters of galaxies. Electromagnetic radiation from galaxies and quasars and the background radiation at radio, infrared, and x-ray frequencies. Introduction to cosmology, models of the universe, and their evolution. The Big Bang and the physical processes in the first three minutes. Prerequisites: calculus and one year of college physics at the level of the 50 series or equivalent.

3 units, Win (Petrosian) MW 1:15-2:30

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 the lattice gas. Irreversible processes. Prerequisites: 55 or admission to Advanced Sequence, and Math. 130.

170. 4 units, Aut (Laughlin) MW 10
171. 4 units, Win (Laughlin) MW 10


3 units, Spr (Michelson) MW 10

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) MW 11

190. Independent Study—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) by arrangement

192. Introductory Biophysics—(Enroll in Applied Physics 192.)

3 units, Win (Doniach)

198. History of Physics—(Enroll in History and Philosophy of Science 168; History 139A.)

5 units, Win (Staff) MTWTh 10

201, 202, 203. Advanced Physics Laboratory—Experiments in atomic physics, nuclear physics, solid state physics, low-temperature physics, optics, and particle physics. 201 is individually prepared lab experiments. 202 consists of student prepared low-temperature experiments. 203 consists of continued experiments at the Advanced Physics Lab level or preparation of a new experiment. (Optional for Physics majors.) Prerequisites: 105, 107. Recommended: prior or concurrent registration in 171.

201. 3 units, Win (Walker)
     Spr (Kapitulnik)
202. 3 units, Aut (Osheroff)
203. 3 units, Win (Walker)
     Spr (Kapitulnik)

204. Senior Seminar in Theoretical Physics—Topics of recent interest in theoretical physics: string theory, supersymmetry, inflationary cosmology, chaos, and others. Work in the seminar may provide a basis for an honors project in theoretical
205. Honors Program — 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. Prerequisites: superior work in physics as an undergraduate major and approval of the honors committee. 1-8 units, Aut, Win, Spr (Yearian). Sum (Staff)

207, 208. Laboratory Electronics — (Enroll in Applied Physics 207, 208.)

207. 3 units, Win (Fox)
208. 3 units, Spr (Fox)


3 units, Aut (Peskin) MW 9:30-10:50

211. Continuum Mechanics — Fluid mechanics: foundations, kinematics, and dynamics of incompressible and compressible flows. Topics: surface waves, weather, soundwaves, 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 (Romani) MW 9:30-10:50


3 units, Spr (Susskind) MWF 9

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 (Fetter) MW 1:15-2:30
221. 3 units, Win (Fetter) MW 1:15-2:30


230. 3 units, Aut (Linde) MWF 11
231. 3 units, Win (Linde) MWF 11
232. 3 units, Spr (Linde) MWF 11


3 units (Wojciecki)

alternate years, given 1995-96

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, Win (Wagoner) TTh 9:30-10:50

271. Introduction to Solid State Physics — Reviews key discoveries in condensed matter physics in the past 15 years, with emphasis on experiment.
290. Research Activities at Stanford — Required of all first-year physics graduate students and strongly suggested for junior physics majors for 1 unit; no registration needed for graduate students. Review of research activities in the department and elsewhere at Stanford at a level suitable for entering graduate students.

293. Literature of Physics — Intensive study of literature of any special topic. Preparation, presentation of reports. If taken under the supervision of a faculty member outside the department, approval of the Physics chair required. Prerequisites: 25 units of college physics, consent of instructor.

294. Teaching of Physics — Required of all teaching assistants in Physics; registration not required. Techniques of teaching physics by means of lectures and lab.

301. Astrophysics Laboratory — Combined seminar/lab investigating the fundamental observational basis of physical models of astronomical objects. Observational component uses the 14-inch telescope at the Stanford Observatory and ancillary photometric and spectroscopic instrumentation. Emphasis on spectroscopic and photometric observation of main sequence, post-main sequence, and variable stars. Limited enrollment. Prerequisite: consent of instructor. (Offered occasionally)

312. Basic Plasma Physics — (Enroll in Applied Physics 312.)

315. Topics in Computational Physics — (Enroll in Applied Physics 315.)

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.


324. Introduction to Accelerator Physics — (Enroll in Applied Physics 324.)

system on CP violation; charged and neutral current neutrino scattering; the standard model of electroweak interactions; determinations of $\sin^2(\theta_W)$; 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. Offered occasionally.

351. 3 units, Win (Marsiski)
352 3 units, Spr (Marsiski, Staff)

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 1995-96

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, Spr (Petrosian) TTh 2:15-3:30
alternate years, not given 1995-96

3 units, Win (Sturrock)
alternate years, not given 1994-95


not given 1994-95

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.

alternate years, given 1995-96


3 units (Zhang)
alternate years, given 1995-96

3 units, Spr (Shen)

373. Solid State Theory: Continuation — (Enroll in Applied Physics 373.)
3 units, Win (Harrison)

374. Electronic Structure — (Enroll in Applied Physics 374.)
3 units (Harrison) given 1995-96

375. Cooperative Phenomena — (Enroll in Applied Physics 375.)
3 units, Win (Kapitulnik)


3 units, Spr (Zhang)
alternate years, not given 1995-96

383. Introduction to Atomic Processes — (Enroll in Applied Physics 383.)
3 units (Harris)
alternate years, given 1995-96

387. Quantum Optics and Measurements — (Enroll in Applied Physics 387.)
3 units, Win (Yamamoto)

388. Mesoscopic Quantum Physics — (Enroll in Applied Physics 388.)
3 units (Yamamoto)

450,451,452. Theoretical Physics of Particles and Fields — Advanced topics in theoretical high-energy physics. Topics change quarterly and each year to survey the elements of formalism needed for theoretical research. Topics for Autumn: lattice gauge theory and QCD strings. Winter: introductory string theory. Spring: quantum chromodynamics. Prerequisite: 332.

450. Special Topics in Quantum Theory of Transport Phenomena — Quantum kinetic equation. Electron transport in normal metals. Quantum diffusion. Tunneling with dis-

3 units, Aut (Dykman)

451. Collider Physics
3 units, Win (Hewett)

452. String Theory
3 units, Spr (Peskin)

453A,B. Special Topics in Accelerator Physics — Research level discussions of current topics in accelerator physics. Content varies each quarter and year, depending on the interests of staff and students. Course may be repeated; offered occasionally.

453A. Nonlinear Dynamics in Accelerators
3 units, Aut (Chao)

453B. Microwave Linear Accelerators
3 units, Win (Miller, Wilson)

460. Astrophysics Seminar — Discussion of current research and literature in astrophysics. Offered by faculty, students, and outside specialists.

1 unit, Aut, Win, Spr (Petrosian) Th 4

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. Course may be repeated. Offered occasionally.

473A,B. Special Topics in Condensed Matter Physics — (Enroll in Applied Physics 473A,B.)

473A. Physics of Strongly Correlated Electron Systems
3 units, Aut (Doniach)

473B. Current Topics in Condensed Matter Physics
1 unit, Aut (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) by arrangement

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) by arrangement

POLITICAL SCIENCE


Chair: Lucius J. Barker


Associate Professors: Luis R. Fraga, Judith L. Goldstein, Terry L. Karl

Assistant Professors: Geoffrey Garrett, Kurt T. Gaubatz, Michael A. McFaul (on leave), Scott D. Sagan, Mark Tunick

Courtesies Professors: David Baron, Steven H. Chaffee, Gerald Dorfman, Jean-Pierre Dupuy, Lawrence Friedman, Roger Noll

Courtsety Associate Professors: Jonathan B. Bendor, Coit D. Blacker, Keith Krehbiel

Courtesies Assistant Professors: Susanne Lohmann, Debra Satz

Affiliated Professors: David P. Baron, Michael W. Kirst, Walter Lohnes, Michael M. May

Senior Lecturer: Elisabeth Hansot

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

To receive an A.B. in Political Science, a student must:

1. Complete 45 units of Political Science courses.
2. Take an advanced course in three different areas chosen from:
   a) General; Political Organizations (100-109, 200-209)
   b) Comparative Politics (110-129, 210-229)
   c) International Relations (130-149, 230-249)
   d) Political Theory (150-169, 250-269)
   e) American Politics (170-198, 270-298)

   (Introductory courses numbered below 100 do not fulfill a field distribution requirement but do count toward the total political science units.)
3. Take at least one seminar (which could at the same time fulfill an area requirement).
4. Bridge the gap between 45 units and the 60 units required for a degree by taking courses
either in Political Science or in other departments, provided that non-departmental courses relate in a direct way to the student’s major focus in political science.

Directed reading units may not be used to fulfill a distribution requirement, and no more than 10 units of directed reading may be counted toward the 45 political science units.

A maximum of 20 units of transfer work may be given political science credit toward the major.

All courses counting toward the 60-unit requirements must be taken for a letter grade, although units in excess of the required 60 may be taken on a Satisfactory/No Credit basis.

**PUBLIC POLICY EMPHASIS**

The student who wishes to receive an A.B. degree with a focus on public policy may choose the “public policy concentration” within the political science major. This program introduces the student to political and economic institutions and processes, analytical techniques, and substantive courses in public policy. For further information, consult with the department’s Director of Undergraduate Studies.

**PRIZES**

There are four annual prizes for undergraduate students: the Edwin A. Cottrell Memorial Prize for the best student in Political Science 1, the Arnaud B. Lavelle Memorial Prize for the best paper in the History of Political Thought sequence (Political Science 151A,B,C), a cash prize for the best thesis written in political theory, and the Lindsay Peters, Jr., Memorial Prize for the outstanding student each year in Political Science 10.

**HONORS PROGRAM**

This program offers qualified students an opportunity to conduct independent research and to write a thesis of superior quality summarizing the results of their research. It provides for close contact between students and their advisers, so that students can receive intensive guidance and assistance throughout their research and writing. The aim is to help students through the process of research, analysis, drafting, rethinking, and redrafting essential to excellence in writing.

Because the honors thesis program involves close student-faculty contact, the basic requirement for admission to the program is that students 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 letter grade indicator (LGI) 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 (LGI 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). The TOEFL requirement is waived for applicants who have recently completed two or more years of study in an English-speaking country. The Test of Spoken English (TSE) is also mandatory. For details concerning these tests see Guide to Graduate Admission. The application deadline is January 1. Admission is offered for the Autumn 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 letter grade indicator (LGI) 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 "Advanced 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 coterminal bachelor's and master's degree program.

DOCTOR OF PHILOSOPHY

The University's basic requirements for the Ph.D. degree are discussed in the "Advanced 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 letter grade indicator (LGI) 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 the 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, all of which must be at least 100 level and above. Two of these courses, in separate concentrations of political science, must be 200 level and above. All grades must be an LGI of ‘B’ or better. Candidates are 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**

*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 Courses,
   Degrees, and Information goes to press; how-
   ever, 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, in-
   cluding control of monopoly, poverty, and for-
   eign policy. Political process: influence of cul-
   tural, economic, and political factors and the
   location of political power on determination of
   public policy. DR:9(5)
   5 units, Aut (Brady)

15. Introduction to Politics — Open only to lower-
   level undergraduates. Introduction to thinking ge-
   nerically about politics in local, national, and in-
   ternational settings. Lectures on ten topics, followed
   by two discussion sessions. Readings from political
   theory, contemporary research, novels, and docu-
   ments. Optional films and videos. Short papers
   required. Enrollment limited.
   5 units, Win (Schmitter)

10. American National Government — The role
    and importance of the ideal of democracy in the
    evolution of the American political system. Ameri-
    can political institutions (the Presidency, Congress,
    and the Court) and political processes (the forma-
    tion of political attitudes and voting) are examined
    against the backdrop of American culture and politi-
    cal history. Major areas of public policy in the
    current practice of the ideal of democracy. DR:9(5)
    5 units, Win (Ferejohn)

20. Introduction to Comparative Politics — Intro-
    duction to basic concepts and theories of compara-
    tive politics; selected examples of existing political
    systems (usually including Britain, France, Russia,
    and China); issues of democratization and political
    change. DR:9(5)
    5 units, Spr (Staff)

25. Colonialism and Nationalism in the Third
    World — Comparative historical analysis of Euro-
    pean exploration, conquest, and colonial rule in
    Latin America, the Caribbean, Africa, and Asia.
    Factors affecting the timing, character, and effec-
    tiveness of nationalist movements in the Third World.
    Impact of colonialism on post-colonial political and
    economic systems. DR:2(*) or 9(5*)
    5 units, Spr (Abernethy)

35. International Politics — Approaches to the study
    of world politics including realism, Marxism, and
    bureaucratic politics. WWI, the nuclear arms race,
    and international economic relations. The norma-
    tive and policy implications of different theories.
    DR:9(5)
    5 units, Aut (Krasner)

    Introductory survey of international and regional
    security relations from the closing days of WWII to
    the collapse of the Soviet Union and the onset of the
    post-Cold War era. Interdisciplinary faculty lecture
    on arms control and the nuclear arms race; the
    military legacy of the Cold War; sources of conflict
    in the post-Cold War world; regional security is-
    sues; the proliferation of advanced weapons tech-
    nologies; and peacekeeping, peacemaking, and the
    resolution of international conflict.
    5 units, Win (Blacker, Holloway)

51D. Introduction to Political Philosophy — (En-
    roll in Philosophy 30, Public Policy 103A.)
    5 units, Win (Satz)

60. The American Dream — Critical analysis of
    America’s dominant ideology, the American Dream,
    as experienced by women, minorities, labor, Indi-
    ans, and immigrants. DR:3
    5 units, Win (Manley)

61. American Political Thought — Survey of the
    major “isms” of American political theory: republi-
    canism, racism, feminism, elitism, capitalism, so-
    cialism, liberalism, and conservatism.
    5 units, Spr (Manley)

80. Crucial Decade: Politics of the 1960s — Role
    and interaction of individuals, interests, and institu-
    tions in shaping and responding to major develop-
    ments in the 1960s: the Civil Rights Movement, the
    Warren Court revolution, the Vietnam War, and
    urban disorders.
    5 units (Barker) given 1995-96

98. Dialogues Tutorial: Promises and Moral
    Obligation — (Same as Ethics in Society 98.) Ad-
    dresses abstract issues of moral philosophy by fo-
    cusing on a familiar, concrete, and accessible topic,
    the moral obligation to keep promises.
    2 units, Spr (Tunick)

99B. Peters Seminar: Evolution of Sovereignty —
    Series of presentations by the instructor and stu-
    dents. Student presentations focus on contemporary
    issues, e.g., the legitimacy of intervening in the
    internal affairs of other states for humanitarian
    reasons (Somalia) or to prevent ethnic conflicts
    (Bosnia), the prospects for international coopera-
    tion in the coordination of macro-economic policy,
    and the wisdom of open vs. closed trade policies.
    Prerequisite: 35.
    3-5 units, Win (Krasner)
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 — Applications of probability and statistical methods in political science. Corequisite: Statistics 190.

2 units, Aut (Rivers)

100B. Statistical Modeling for Political Science — Specification and estimation of statistical models of political processes. Focuses on the multiple regression model and its extensions.

3 units, Win (Rivers)

100W. Politics, Economics, and Welfare — Develops a systematic and formal framework to the study of politics and political decision making and applies this approach to a range of questions. The determinants of public policy: why is one political decision made instead of another in the context of American politics. Applications: the rise of the new regulatory state, the Gulf War, and affirmative action. The design of electoral systems and their effects on political outcomes, bureau-pluralism in Japan and other Asian NICs, and economic reform in the developing and post-socialist countries. Important questions in international relations. Prerequisite: 1 or 10.

5 units, Win (Weingast)

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 (Brady)


5 units, Win (Moe)


5 units, Win (March) given 1995-96

108. Organizational Leadership — (Same as Sociology 165, Business 379.) Problems of leadership in complex organizations: universities, schools, hospitals, business firms, armies, and public bureaucracies. The role of major executives.

5 units, Aut (March)

109. Directed Reading/Research in Political Organizations — Advanced individual study in public administration.

any quarter (Staff) by arrangement

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 during the last two decades. After a prolonged period of politi-
112D. Readings in Political Science and International Relations — (Enroll in German Studies 52D.)
3-4 units, Aut (Staff)

113A. Politics and Development in Latin America — Survey of the major political systems in Latin America (normally Argentina, Brazil, Cuba, and Mexico), the patterns of economic and social development associated with them, and their historical and international contexts. DR:9(5)
5 units, Spr (Packenham)

114K. The Political Economy of Development — Introduction to major theories of political development, emphasizing interplay between economic and political processes, and national and international factors from Latin America and Africa and Asia. Cases include Brazil, China, Cuba, El Salvador, India, Taiwan, Nigeria, and Venezuela DR:2(*) or 9(5*)
5 units (Karl) given 1995-96

115. Politics in the People’s Republic of China — Introduction to politics in China: the historical background of the communist revolution; post-1949 political development; and selected topics — institutions, ideology, policy-making process, and state-society relations. DR:2(*) or 9(5*)
5 units, Win (Staff)

116. European Politics and Society — The Integration of Europe — 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). Considers 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 (Schmitter) given 1995-96

116L. Social Foundations of Democracy — (Same as Sociology 112.) Social, cultural, political, economic, and international factors favorable to the development and consolidation of democracy in historical and comparative perspective. Worldwide development and re-emergence of democracy in the past decade. Case studies of the individual country’s experiences with democracy.
5 units, Spr (Diamond)

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. DR:2(*)
5 units (Abernethy) given 1995-96

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. DR:2(*) or 9(5*)
5 units, Spr (Garrett)

122G. The Political Economy of Contemporary Europe — Analysis of the decline of the Keynesian welfare state and interventionist government; the reinvigoration of the European Community (1992, EMU, political union, enlargement); and the integration of eastern and western Europe. The interactive effects of political pressures (e.g., for government interventions to ameliorate market outcomes) and economic constraints (e.g., the need to compete in global markets or to attract foreign capital) on the policies pursued by national governments, domestically and on the European stage. DR:9(5)
5 units, Spr (Garrett)

123M. Seminar: Post-Communist Politics — 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 polities.
5 units, Spr (Staff)

124. Seminar: Political Economy of Latin American Development — Basic concepts and theoretical frameworks, single-country case studies, and research and political strategies regarding political, economic, and social development in Latin America.
5 units, Aut (Packenham)

125. The Rise of Industrial Asia — (Same as Economics 130.) The political, economic, social, and cultural aspects of industrial development and change in Asia as a region. Prerequisite: consent of instructors.
5 units, Aut (Okimoto, Lau, Raphael, Rohlen)

126C. Seminar: Constitutionalism — Preference given to seniors in Political Science. The role of constitutions. What is a constitution? Why do we have written constitutions? What are the different functions performed by constitutions in different
countries? How important is the institution of judicial review? Constitution-making in Eastern Europe in the present period.

5 units, Win (Casper) M 7-9 p.m.

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, Win (Karl)

129. Directed Reading/Research in Comparative Politics — Advanced individual study in comparative politics.

any quarter (Staff) by arrangement

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 these 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.

130. How Nations Trade — Economic theory predicts that free trade is in the interests of all countries and their citizens. The historical record shows protection endemic to all of them. The relationship between economic forces that push countries in the direction of free trade and the political pressures that lead countries in the opposite. Topics: GATT, bilateral, and regional trade blocs in Europe, N. America, and E. Asia. The future of global trade and its effects on international and domestic politics.

5 units, Aut (Garrett, Goldstein)

133. Peace Studies — (Same as Education 173X, History 154, Psychology 142, Sociology 108.) 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. Lectures on how our world is changing; the nature of peace and peaceful processes; peace at the operational level (the causes of war, building negative peace, building positive peace); peace — moral and normative considerations; peace and you.

5 units, Spr (Bernstein, Bland, Drekmeier, Holloway, Moses, Noddings, Ross)

MTW 1:15 and by arrangement

134A. Strategy, War, and Politics — Traditional and modern theories on the causes of war and the choice of military doctrine. Contrasting explanations for the origins of WWI and II; alternative theories of deterrence in the nuclear age; the causes of war in the Persian Gulf. Current dilemmas of American nuclear weapons policy, intervention in global conflict, and efforts to combat terrorism.

DR:9(5)

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 — (Same as 234P, Engineering-Economic Systems 170.) 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 issues, along with 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 policymakers. For certain cases, decisions in countries other than the U.S. are examined.

3 units, Aut (May) MW 4:15-5:30

135. International Politics — See 35. Limited to students with graduate standing.

5 units, Aut (Krasner)

136P. The Role of Technology in Policy Decisions — (Same as Engineering Economic Systems 171; Science, Technology, and Society 172.) Same objectives as 134P, with case studies primarily from recent and current energy and environmental policy
142S. Seminar: Managing Hazardous Technologies — The political and organizational dimensions of efforts to manage hazardous technologies. Problems of international cooperation, risk perception, and organizational learning. Nuclear power, space shuttle disasters, oil tanker accidents, commercial airline crashes, and nuclear weapons. Research paper required.

5 units, Spr (Sagan)

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, Spr (Gaubatz)


5 units (Sagan) given 1995-96

143K. Seminar: Democratic States and International Relations — 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: 35 or consent of instructor.

5 units (Gaubatz) given 1995-96

143L. Seminar: War, Peace, and Organization Theory — (Same as Sociology 168.) Draws on concepts from organization theory to build understanding of military institutions (including technological and doctrinal innovation), the causes of war, and the nature of organizational change. Classic texts in organizational analysis (Simon, March, Cyert) and well-established works in security studies (Allison, Steinbruner, Posen). Focuses on recent organizational approaches (e.g., new institutionalism, cultural approaches) and recently published or forthcoming work on security issues.

5 units, Spr (Eden)

149. Directed Reading/Research in International Relations — Advanced individual study in international relations. any quarter (Staff) by arrangement

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 Feminist Studies 138.) 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. DR:8t(3)

5 units, Aut (Hansot)

151B. History of Political Thought II: Pre-Enlightenment — The secularization of political thought and the development of liberal and republican ideas between the 14th and the 18th centuries. Readings from Calvin, Hobbes, Locke, Luther, Machiavelli, Marsilius, Montesquieu, and Rousseau. DR:8(3)

5 units, Aut (Hansot)

151C. History of Political Thought III: French Revolution to the Present — 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, Dostoyevsky, Kant, Hegel, Marx, Melville, Mill, Nietzsche. DR:8t(3)

5 units, Spr (Hansot)

152. Seminar: Indecency — 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, Aut (Drekmeier)

153. 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. DR:8t(3)

5 units, Spr (Hansot)

154. Feminist Political Theory: Gender Power and Justice — Emphasis 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.

DR:8t(3)

5 units, Aut (Okin)

155. Seminar: Punishment — Central concepts of political theory (authority, freedom, justice, obligation) considered by focusing on problems raised by legal punishment, including: 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? Classic political theories of punishment, literature and empirical studies, and current political debates.

5 units, Aut (Tunick)

156. Seminar: Democratic Theory — The major questions in modern democratic theory, including obedience to authority, alienation, participatory democracy, and political tolerance.

5 units, Spr (Sniderman)

162. Seminar: Capitalism and Democracy — Explores attacks on and defenses 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 on the American dream. Prerequisite: 10 or consent of instructor.

5 units, Spr (Manley)

166. Seminar: Problems in Political Theory — Obligation — (Same as 263.)

5 units (Tunick) given 1995-96

169. Directed Reading/Research in Political Theory — Advanced individual study in political theory.

any quarter (Staff) by arrangement

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. DR:9(5)

5 units, Aut (Tunick)

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 judicial-political 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, Spr (Manley)

177. Seminar: Courts, Politics, and Public Policy — The role and interaction of courts with other political institutions and interests in the for-
178. Seminar: Introduction to Environmental Policy and Law — Overview of American and international environmental policy and law. The roles played by the three branches of U.S. government in shaping and implementing environmental policy. Institutions dealing with international environmental issues. Research paper from one of the seminar’s nine topics.

5 units, Win (Staff)

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 on the role and differential responsiveness of governing institutions to concerns of African Americans.

DR:3 or 9(5)
5 units, Spr (Staff)

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. DR:9(5)
5 units, Aut (Friedman)

184M. Politics and Election Campaigns — Election campaigns from the perspectives of campaign organizations, journalists covering campaigns, political party activists, and individual citizens participating in the electoral process. Students analyze the electoral process from theoretical and applied frames of reference and participate in a campaign of their choosing during the quarter involving a candidate for local, state, or national office, a campaign launched by a specific interest group, or work for a political party.

5 units, Win (Staff)

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.

5 units, Win (Fraga)

186K. American Education and Public Policy — (Same as Education 105, 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 school-
195. Seminar: Race and the American Creed — Examines from the perspectives of black and white Americans the connection between core American values and the problem of race. Qualitative methods and quantitative studies.
5 units, Win (Sniderman)

196. Seminar: 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. Relies on recent, large scale surveys of the opinions and attitudes of Americans.
5 units, Spr (Sniderman)

198. Directed Reading/Research in American Politics — Advanced individual study in politics. Prerequisite: 10 or equivalent.
any quarter (Staff) by arrangement

199. Senior Honors Thesis
any quarter (Staff) by arrangement

199R. Seminar: Honors Research — 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. In most cases non-majors and majors are 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

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 collective decisions. Objective is to survey the central issues and techniques in political economy and to lay 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-course 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 (Diermier)

201B. Seminar: Economic Analysis of Political Institutions — (Same as Business 681.) 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 (Rivers)

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 (Bendor)

206W. Seminar: The Political Economy of Institutions — Survey of economic approaches to organization, emphasizing theory and application, with attention to politics.
5 units, Spr (Weingast)

207M. Seminar: Cross-National Perspectives on Organizations — (Same as Sociology 265, Business 380R.) Perspectives and research on organizations by foreign scholars and in non-American contexts. Emphasis is on identifying a few key concepts from the foreign literature and contrasting the points of view, research results, and experiences with those based on research in the U.S. Prerequisites: Business 270, Sociology 160, or Industrial Engineering 100; consent of instructor.
5 units, Win (March)

209. Directed Reading in Public Administration any quarter (Staff) by arrangement

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 Area, and various experiences in Latin America.

5 units (Schmitter) given 1995-96

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, Aut (Schmitter)

216. Seminar: Business and Labor in Politics — Open to upper-level undergraduates and graduates wishing to write research papers. Explores comparatively the ways in which capitalists and workers defend their interests in modern democracies, emphasizing the role of interest association, arrangements for sectoral governance and differences in public policy in Europe, N. America, and Japan.

5 units, Spr (Schmitter)

219. Seminar: Comparative Institutional Analysis — The effects of political institutions on the translation of societal preferences into public policy outcomes. Socio-economic institutions, e.g., trade unions and the organization of business; and the formal attributes of political systems, e.g., electoral systems (first past the post, alternative vote, STV, list PR, etc.), party systems, the division of authority (federalism, bicameralism, presidentialism) and administrative structures (central banks, bureaucratic agencies, ministerial structure). Empirical examples supplement the theoretical arguments.

5 units, Spr (Garrett)

222K. Seminar: Research on Latin America — (Same as Latin American Studies 251.) Restricted to A.M. and Ph.D. students. Oriented toward defining individual research on contemporary Latin America.

5 units, Win (Karl, Morrison)

222K. Seminar: Contemporary Issues in Latin America — For graduate students; advanced 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 1994-95

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)

224. Seminar: States and Markets in National Development — States and markets are a central focus of policymakers and scholars concerned with national development. Theoretical readings, case studies, and comparative analyses explore patterns of state-market relations, their causes, and their consequences for economic, political, and social development in national units. Emphasis is on recent trends away from socialism and state capitalism toward more liberal policies and models.

5 units, Win (Packenham)

224H. Seminar: The Collapse of the Soviet Union — Causes and Consequences — Analysis of the collapse of the Soviet Union in historical and comparative perspective; theoretical approaches to understanding the causes of the collapse and its consequences for world politics.

5 units, Spr (Holloway)

224K. Seminar: Contemporary Issues in Latin America — (Same as Latin American Studies 251.) Restricted to A.M. and Ph.D. students. Oriented toward defining individual research on contemporary Latin America.

5 units, Win (Karl, Morrison)

225A. Seminar: Principles of Political Economy — Introduces the basic theoretical tools used to analyze the interrelationships between political systems and the economy (spatial models, the logic of collective action, the evolution of cooperation, bargaining theory, and social choice). Empirical applications to cross-national comparisons and political development.

5 units, Aut (Garrett)

227D. Seminar: Consolidating Democracy — Problems and processes of 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. Each student writes a major research paper on an individual country.

5 units (Diamond) given 1995-96

227K. 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; in levels of development and international
context; in modes of demise and efforts at reform; in eventual institutions and practices.

229. Directed Reading in Comparative Politics
any quarter (Staff) by arrangement

INTERNATIONAL RELATIONS

234A. American Foreign Economic Policy — Research seminar on America's response to a changing world economy; the general areas of international trade, finance, and foreign investment examined through analysis of policy issues, e.g., protectionism, monetary coordination, financial adjustment, and NAFTA.

5 units, Spr (Karl)

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 NATO, and the UN.

5 units, Win (Goldstein) given 1995-96

234P. The Role of Technology in National Security — (Same as 134P, Engineering-Economic Systems 170.)

3 units, Aut (May) MW 4:15-5:30

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 globalization of Japan and China. Emphasis 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, Aut (Blacker)

241. World Politics and the Global Economy — Primarily for A.M., MIPS, and advanced undergraduates. Investigates contemporary issues which are affected by economic and political considerations, including regionalization, international trade, finance, North-South relations, and direct investment.

5 units, Spr (Krasner)

243A. 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 (Goldstein)

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 paper.

5 units, Win (Sagan)

243C. Seminar: Theoretical Issues in International Political Economy — Major contemporary theories affecting global economic relations and related national policies.

5 units, Spr (Krasner)

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, Spr (Gaubatz)

244D. Theories of European Imperialism — Alternative explanations for the dominant position Western European countries held in world politics and in the global economy from the 15th to the 20th centuries.

5 units, (Abernethy) given 1995-96

246. Colloquium: Nuclear Weapons — Theories and History — (Same as History 261/361.) Theories of arms races, deterrence, nuclear diplomacy; evaluating these in light of the emerging field of nuclear history. Based on the experience of the main nuclear weapon states.

5 units, Spr (Holloway, Bernstein)


5 units, Win (Gaubatz)

249. Directed Reading in International Relations
any quarter (Staff) by arrangement

POLITICAL THEORY

Graduate students in Political Theory should also see courses numbered 150-169.

254. Essentials of Political Theory — Methods, concepts, and concerns of political theory; problems of valuation and interpretation; recent contributions to the philosophy of political analysis.

5 units (Drekmeier) given 1995-96


5 units, Spr (Staff)
258F. French Democracy vs. British Liberalism — (Enroll in French and Italian 237.)
3-5 units, Win (Dupuy)

259A. Limits of Economic Rationality I: The Nature of the Social Bond — (Enroll in French and Italian 377E.)
3-5 units, Win (Dupuy)

262. Seminar: Thought and Action — The relation between knowing and doing, and making and doing; the ranges from ideological presuppositions of psychological theories, the nature of revolutionary consciousness, various types of knowing and types of ideology, and the responsibilities of science and the role of knowledge as a factor of production.
5 units (Drekmeier) given 1995-96

263. Seminar: Problems in Political Theory — Obligation — (Same as 166.)
5 units (Tunick) given 1995-96

266. Seminar: Gender and Political Theory — (Same as Feminist Studies 103F.) 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, Aut (Okin)

268. Seminar: Contemporary Theories of Justice — Social and political justice. Facilitates understanding of 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) by arrangement

GRADUATE SEMINARS
Seminars numbered 300 and above are limited to graduate students. Instructors should be consulted before enrolling.

300. Thesis
any quarter (Staff) by arrangement

301. Case Studies, Comparative Methodology, and Theory Development — For Ph.D. students who are involved in, or are considering writing dissertations utilizing comparative and case study methodology. Examination of the advantages and disadvantages of using comparative and case study methodology in political science and related fields. How can case studies be used in inductive research efforts to create or develop theory? How can case studies be used to test theories derived by more deductive methods? How does one choose the appropriate types and numbers of cases of theory development and testing? How does one assess causation in historical case studies?
5 units, Win (Sagan)

306. Social and Political Processes in Organizations — (Same as Business 676, Sociology 365.)
5 units, Win (March)
310. Seminar: Selected Topics in Theory and Comparative Politics — Intended primarily to prepare graduate students for teaching in Political Science IS, but open to all who are interested in generic political themes (power, violence, legitimate authority, interest, democracy, autocracy, etc.), with material from political theory, novels, films, and documents. Prerequisite: consent of instructor.
5 units, Aut (Schmitter)

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 (Holloway)

312. Pro-Seminar in Comparative Politics — Follow-up of 311 intended primarily for graduate students writing grant applications and dissertation proposals. Workshop in practical aspects of designing and conducting political research abroad.
5 units, Spr (Schmitter)

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) given 1995-96

315. Workshop on Democratic Theory — Graduate students only. Selected topics in the theory and practice of modern political democracy: its antecedents, causes, processes, types, consequences, and future.
5 units (Schmitter) given 1995-96

316. Seminar: Comparative Democratization — Latin America and Other Regions — (Same as Latin American Studies 310.) Critical issues of democracy, including its definition, problems of transition and consolidation, and comparison. The relationship between democracy and the military, the economy, and the interstate system.
5 units (Karl) not given 1994-95

323. Seminar: Theories of National Development — Literature-review for graduate students in the social sciences and area studies. Analysis of major theoretical approaches and empirical studies regarding political, economic, and social development in national units.
5 units, Win (Packenham)

351. Research Seminar on New Political History — For advanced graduate students studying analytical approaches to political history and political development. Focus is on American politics and some topics from other national contexts. The development of political institutions (elections, legislatures, courts, etc.) and the development of policies. Recent contributions.
5 units, Spr (Perejohn)

371. Research Seminar: Judicial Politics and Constitutional Law
5 units (Barker) not given 1994-95

380A,B,C. Workshop on Political Economy
5 units, Aut, Win, Spr (Perejohn)

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, 126 Sweet Hall.

MORRISON INSTITUTE FOR POPULATION AND RESOURCE STUDIES

Faculty: Marcus W. Feldman, Director (Biological Sciences); Carl Djerassi (Chemistry), William Durham (Anthropology), Paul R. Ehrlich (Biological Sciences), Lawrence H. Goulder (Economics and Institute for International Studies), Mary Lake Polan (Gynecology and Obstetrics), Scott Rozelle (Food Research), Shripad Tuljapurkar (Biological Sciences)

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 and graduate students to a variety of issues in population-related specialties.

For the convenience of interested students, offerings of population studies at Stanford are listed below.
COURSES

ANTHROPOLOGY

133A,B,C. The Ethics of Development in a Global Environment (EDGE) — (Same as Political Science 140A,B,C, Engineering 297A,B,C.)
1-4 units, Aut, Win, Spr
(Lusignan, Packenham, Gupta)

161A. Conservation and Community Development in Latin America — (Same as Human Biology 139, Latin American Studies 196.)
3-5 units, Win (Durham, Irvine, Umaña)

164. Ecological Anthropology — (Same as Human Biology 134.)
3-5 units (Staff) not given 1994-95

168. Medical Anthropology — (Same as Human Biology 168.)
5 units, Win (Barnett)

169. Indigenous Peoples and Environmental Problems — (Same as Human Biology 149, Latin American Studies 129.)
3-5 units (Durham, Sawyer)
not given 1994-95

1994-95

263. Political Ecology
5 units, Spr (Durham)

264. Advanced Ecological Anthropology
5 units (Durham) not given 1994-95

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, not given 1995-96

142. Principles of Ecology — (Same as Geophysics 176.)
3 units, Aut (Roughgarden)

146. Colloquium on Population Studies — (Same as Human Biology 60.)
1 unit, Win (Feldman)

175H. Problems in Marine Biology
15 units, Spr (Block, Denny, Epel, Gilly, Levine, Powers, S. Thompson)

216. Ecosystem Ecology and Global Biogeochecmstry
3 units, Spr (Vitousek)

349. Seminar in Population Ecology
1-3 units, Aut, Win, Spr (Ehrlich)

383. Seminar in Population Genetics
1-3 units, Spr (Feldman)

384. Seminar in Theoretical Ecology
1-3 units, Spr (Roughgarden)

EARTH SCIENCES

112. Anthrosphere: Human Interactions with Earth and the Environment
4-5 units, Spr (Gould)

FOOD RESEARCH INSTITUTE

121/219. Development and Population Interactions in the Third World — (Same as Economics 119/219.)
5 units, Win (Yotopoulos)

136/236. Population Perspectives in the Third World — (Same as Economics 133, Human Biology 136, Sociology 153.)
5 units, Spr (Wilson)

148/248. The Economic Development in Greater China — (Same as Economics 121.)
5 units, Spr (Park)

213. International Development Policy Analysis III
5 units, Spr (Pearson, Albers, Josling)

327. Renewable-Resource Economics and Developing Countries
3-5 units, Win (Albers)

HEALTH RESEARCH AND POLICY

270. International Health
2-4 units, Spr (Basch)

HUMAN BIOLOGY

105. Ethnogerontology
4 units (Gallagher-Thompson, Yeo)
not given 1994-95

118. Human Diversity: A Linguistic Perspective
3 units, Spr (Ruhlen)

120. Human Nutrition
4 units, Aut (Butterfield)

145. Third World Development
5 units, Aut (Crow)

148. Environmental Policy
3 units (A. Ehrlich) not given 1994-95

150. Seminar: Gender-Specific Perspectives on Birth Control — (Same as Feminist Studies 145.)
6 units (Djerassi) not given 1994-95

182. Peasant Society: Economy and Environment — (Same as Anthropology 149A.)
4 units (Crow) not given 1994-95

LATIN AMERICAN STUDIES

87. Urbanization, Poverty, and Children in Latin America
5 units, Spr (Morrison)
137/271. Special Topics in Latin American Economics
5 units, Aut (Lizano)

138/270. Masses and Politics in Latin America
5 units, Spr (Weffort)

195. Perspectives on Sustainable Development in Latin America
5 units, not given 1994-95

SOCIOLOGY

217. Spatial Systems and Social Processes
3, 5, or 8 units, Spr (Hochberg)

OVERSEAS STUDIES

106H. Man-Environment Interactions: Case Studies from Central Chile — Santiago.
5 units, Aut (Hajek)

5 units, Aut (Hachette)

5 units, Win (Hajek)

Emeriti: (Professors) Leo Ganz, Albert H. Hastorf, Ernest R. Hilgard, Douglas H. Lawrence, Eleanor E. Maccoby
Chair: Ellen M. Markman


Associate Professors: Laura L. Carstensen (on leave Winter, Spring), Anne Fernald (on leave Autumn), Susan Nolen-Hoeksema

Assistant Professors: John D. E. Gabrieli, James J. Gross, David J. Heeger, Felicia Pratto


Affiliated Faculty: Albert Ahumada, Jr., Douglas Daher, Vincent D'Andrea, Sam Edwards, Marilyn Hoskins, Karen Huang, Edward Leland, Elise Lenox, Alejandro Martinez, Robert Matano, Donald Norman, Carol Pertovsky, Barbaranne Shepard, Andrew B. Watson
Senior Lecturer: Lyn Carlsmit
Director, Bing Nursery School: Jeanne Lepper
Visiting Lecturer: Diann W. McCants

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 Science Foundation and a special grant from Mrs. Anna Bing Arnold and Dr. Peter Bing.

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 five content area tracks, and (3) 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

For the A.B. degree, a total of 65 units in psychology and supporting fields are required; of these, a minimum of 45 units must be completed in psychology. At least 23 of the 45 units of Psychology must be taken at Stanford. A maximum of 20 units in non-introductory courses in supporting fields (that is, biological sciences, computer sciences, mathematics, physical sciences, and social sciences) may also be counted toward the 65-unit requirement.

Beyond these overall requirements, the 45 units in psychology must include Psychology 1 and 60, and at least two courses from each of the two groups listed below. Group A consists of broad content courses in cognition, perception, physiological psychology, and psycholinguistics. Group B consists of courses in social, developmental, abnormal, and personality.

Group A: 70, 102, 106, 108, 120, 141, 146, 148, 156
Group B: 111, 113, 115, 116, 121, 130, 136

The course lists for the two groups may change from year to year. Students should check with the Academic Assistant.
At least 35 of the 45 units of Psychology must be taken in courses other than independent study and practica. Independent study and practica courses (104, 167, 168, 184, 185, 188) are graded on a mandatory Satisfactory/No Credit basis.

A transfer student must take at least 23 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. All students must satisfy Group A and Group B requirements 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 in the department and in supporting disciplines, such as anthropology, biology, statistics, and computer science. 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, Computational 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.

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, Computational 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 example, 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 Academic Assistant 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, though not necessary, 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 prepared 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 tests) as part of the application. This examination may be taken at most universities and colleges.

MASTER 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 University residency requirements for the degree and are responsible for consulting with their primary departments or the Financial Aids 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) 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.

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) 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 18 must be in psychology courses numbered 200 or above. Units from Psychology 275 (Graduate Research) may not be counted toward these 18 units; service as a teaching assistant for Psychology 1 or 60, through registration in 257 or 281 (Practicum in Teaching), may only be counted for up to 3 of these 18 units. Two of the graduate courses must be selected from the courses listed as "core course" requirements for the Ph.D. in psychology, one from the "A" list and one from the "B" list. In addition, at least one statistics course beyond the introductory level is required. The course must be approved by the student's adviser. All courses to be counted toward the master's degree must be passed with a letter grade indicator (LGI) of 'B-' or better (unless the course is offered only on a Satisfactory/No Credit basis). Demonstration of competence in the design and execution of psychological research is also required for receipt of the master's degree. Normally, this demonstration will entail completion of a master's thesis. However, other evidence of substantial experience in the design and conduct of psychological research may, with the approval of the department's Committee on Graduate Studies, be substituted for a formal master's thesis.

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
256. Decision and Judgment

Group B:
211. Advanced Developmental Psychology
212. Social Psychology
213. Personality
216. Abnormal Psychology

The student is expected to spend at least half of the time in research from the beginning of the
Dissertation Requirements—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.

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.

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 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, but the formal CADA procedure need not be repeated.

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.

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, of course, 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 60, 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, and Philosophy, 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 SUMMER SESSION

The courses announced for the Summer Session are those regularly scheduled in the department curriculum. Additional courses may be an-
nounced in the bulletin Summer at Stanford issued annually in January.

OPEN TO ALL STUDENTS

Additional courses not listed here are frequently offered in the areas of their special research competence by selected postdoctoral or terminal Ph.D. personnel. These are listed in the quarterly Time Schedules, and 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. DR:9(4)

   4 units, Aut (Carstensen) MWF 11-12:15
   Win (Wandell, Nolen-Hoeksema) MWF 11-12:15
   Spr (Gabrieli) MWF 11-12:15

1A. Introduction to Psychology Discussion Section — Optional supplement to 1. Corequisite: concurrent enrollment in 1.

   1 unit, Aut, Win, Spr (Staff) by arrangement

60. Statistical Methods — The elements of statistical description (measures of average variation, correlation, etc.). Develops an understanding of statistical inference. Emphasis is on those statistical methods of principal relevance to psychology and related social sciences. Students who receive credit for 60 are not given credit for Statistics 60. DR:4(6)

   5 units, Aut (Thomas) MTWThF 9
   Spr (Staff)

70. Brain and Behavior — Introduction to the study of 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 and memory. DR:5(7)

   3 units, Aut (R. Fernald, Wandell, Wine) TTh 11-12:15

102. Perception — A review of the basic processes of vision and hearing. Topics: basic anatomy of the eye and ear, speech perception, color vision, depth perception, and more. DR:9(4)

   3 units, Spr (Heeger) TTh 11-12:15

104. Special Laboratory Projects — Independent study. Can be repeated for credit. Prerequisites: 1, 60, and consent of instructor.

   1-6 units, any quarter (Staff) by arrangement

106. Introduction to Cognitive Psychology — Survey and analysis of major topics in cognitive psychology, including perception, memory, problem solving, and reasoning. Emphasis on contemporary research and theory. Prerequisites: 1 and 60, or consent of instructor. DR:9(4)

   4 units, Win (B. Tversky) TTh 1:15-2:30

107. Cellular Neuroscience: Cell Signaling and Behavior — (Same as Biology 153.) Survey of neural interactions underlying behavior. Prerequisites: 1 or equivalent, and elementary biology.

   4 units, Aut (Wine) TTh 1:15-2:30

108. Cultural Psychology — (Same as Anthropology 155.) The cultural sources of diversity in thinking, emotion, motivation, self, personality, morality, development, and psychopathology. Prerequisite: 1 or equivalent.

   3 units, Spr (Markus) MW 2:15-3:30

109. Biological Psychology — What the human mind is, what its relationship to the brain is, how it works, and why we are the way we are. Focuses on the biological mechanisms that are most relevant to key issues in psychology — the mind-body problem, the development of language and learning, innate aspects of perception, and affective states. The neuronal machine underlying perception, selective attention, and deposition into working memory and permanent memory.

   3 units, Spr (Ganz) TTh 11-12:15

111. Developmental Psychology — Psychological development from birth to adulthood, emphasizing the infancy, early childhood, and middle childhood years. The nature of change during childhood and theories of development. Supervised experience with children at Bing School, Stanford's child development laboratory school, is available if taken for 5 units. Prerequisite: 1 or equivalent. DR:9f(4)

   3 or 5 units, Aut (Flavell) MWF 10

113. Personality — A balanced introduction to 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. Personality disorders and psychopathology. Prerequisite: 1 or equivalent.

   3 units, Spr (Gross) MW 9:30-10:50

114. Ion Transport and Intracellular Messengers — (Graduate students register for 228.) Ion channels, carriers, and 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: introductory course in biology or human biology, or 107.

   3 units, Spr (Wine)

115. Social Development — Socialization and the development of social behaviors. Review of research concerning conscience and conduct, altru-
ism and aggression, cooperation and competition, achievement and self-control.
3-4 units (M. Lepper) not given 1994-95

116. The Psychology of Gender — (Same as Feminist Studies 126.) Research and theory on the socialization and psychological development of women and men. The biological, cultural, and social factors that influence gender specific behavior. DR:9f(4)
3 units (Carstensen) not given 1994-95

117. Observation of Children — Seminar on learning about children through guided observations at Bing School, Stanford's Child Development Laboratory School. Physical, emotional, social, cognitive, and language development studied. Recommended: 111.
3-5 units, Win, Spr (Chandler)
Th 4-5:30 and by arrangement

118. Development in Early Childhood — Supervised experience with young children at Bing School, Stanford's Child Development Laboratory 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: 111 or 117, or consent of instructor.
3-5 units, Aut (Hartman) T 4-5:30
and by arrangement
Win, Spr (J. Lepper) T 4-5:30
and by arrangement

120. Cognitive Development — Topics and issues on cognitive development, developmental changes in memory, conceptual organization, logical reasoning, and communication skills. Prerequisite: 1.
DR:9f(4)
3-4 units (Markman) not given 1994-95

121. Social Psychology — Interpersonal behavior. Survey of relevant research concerning attitudes, groups, person perception, and selected topics in social psychology. Prerequisite: 1 or equivalent.
DR:9f(4)
4 units, Aut (Pratto, Zimbardo) TTh 1:15-2:45
section by arrangement

122. Children's Literature: A Psychological Perspective — The ways of looking at children's literature (ages 2-12) as mirrors for the conscious and unconscious, as reflectors of what children value, and as indicators of where our society is headed. Writers and illustrators: Russell Hoban, A. A. Milne, Maurice Sendak, and E. B. White, etc. Fairy tales are discussed from several viewpoints including the psychoanalytic represented by Bruno Bettelheim. Enrollment limited to 20. Prerequisites: 1 or 117, and consent of instructor.
3 units, Win (B. Shepard) TTh 1:15-2:30

124. Research on Aging — Two-quarter seminar on aging, with practicum. Review of current research and participation in ongoing data collection, analysis, and interpretation. Prerequisite: consent of instructor.
4 units, Aut (Carstensen) W 2:15-3:45

125. Psychology and Law — 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: 1 or 121.
4 units, Aut (Rosenhan) TTh 1:45-3

126. Culture and Self — (See 226.) Prerequisites: 1, 60, 121.
3 units, Win (Markus)
alternate years, not given 1995-96

127. 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) MWF 10

128. Research Methods and Experimental Design — Examination of experimental research methods and principles in psychology. Structured research exercises and the design of an individual research project are required. Prerequisite: consent of instructor.
5 units, Spr (M. Lepper) TTh 1:15-3:05

130. Development in Infancy — (Same as Human Biology 123.) Development in the first two years of life. Topics: prenatal development and childbirth, perceptual development, cognitive development in infancy, parent-infant interaction, infant social cognition, the development of emotion, and preverbal communication. Prerequisite: 1 or Human Biology core.
3-4 units, Spr (A. Fernald) TTh 1:15-2:30

132. Laboratory Course in Developmental Psychology — For students interested in acquiring 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 and at the Bing School. Limited enrollment. Prerequisites: 111 or 120 or 130, and consent of instructors.
4 units, Win (A. Fernald, Flavell, Markman) MW 11-12:15
132A. Laboratory Section for Psychology 132 — Required concurrent enrollment in 132.
   2 units, Win (A. Fernald, Flavell, Markman) F 11-12:15

134. The Affective Disorders — (Graduate students register for 234.) Current evidence on the experience of depression and mania in adults and children, including gender, socioeconomic class, and culture differences in depression. The genetic, biochemical, psycho-dynamic, cognitive, and behavioral theories of affective disorders, and the treatments prescribed by these theories. Prerequisite: 136.
   3 units, Spr (Nolen-Hoeksema) TTh 10-11:15

136. Abnormal Psychology — The characteristics, possible causes, and best treatments for many types of psychological disturbance. Emphasis is on how one builds and tests theories of psychological disturbances. Prerequisite: 1 or equivalent. DR:9(4)
   3 units, Win (Nolen-Hoeksema) MWF 1:15

137. 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: 136.
   3 units, Spr (Horowitz) TTh 9:30-10:50

138. Carl Jung and Analytical Psychology — Introduction focusing on 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. Extended discussions of archetypal themes of the shadow, animas/animus (feminine/masculine) and puer/senex (youth/elder). Function of dreams and the interplay between the Jungian paradigm and spirituality.
   4 units, Aut (Daher) TTh 1:15-3:05

140. Sleep and Dreams — (Same as Human Biology 11.) Multi-media 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, and other areas.
   3 units, Win (Dement, Rosekind) TTh 11-12:15

141. Human Neuropsychology — Topics in human neuropsychology. Review of functional organization of 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.
   3 units, Spr (Gabriel) TTh 10-11:15

142. Peace Studies — (Same as Education 173X, History 154, Political Science 133, Sociology 108.) 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. Lectures on how our world is changing; the nature of peace and peaceful processes; peace at the operational level (the causes of war, building negative peace, building positive peace); peace — moral and normative considerations; peace and you.
   5 units, Spr (Bernstein, Bland, Drekmeier, Holloway, Moses, Noddings, Ross) MTW 1:15 and by arrangement

143. Conceptual Organization and Development — See 242. Prerequisite: 120 or consent of instructor.
   alternate years, not given 1995-96

146. 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. DR:9(4)
   4 units, Aut (H. Clark) MWF 1:15

148. Biological Basis of Behavior — (Same as Human Biology 157.) 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, Spr (R. Fernald) TTh 8:40-9:50
   alternate years, not given 1995-96

152. Statistical Methods for Behavioral and Social Sciences — For undergraduates; see 252.

153. Statistical Theory, Models, and Methodology — For undergraduates; see 253.

155. 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 abilities in relation to motivation, personality, gender, and ethnic differences. Prerequisite: 1 or equivalent. DR:9(4)

3 units, Win (Snow) MWF 10

156. Decision and Judgment — (Graduate students register for 256.) Theory and experiments about decision making and judgment under uncertainty. Focuses on the contrast between the rational theory of judgment and choice, and the psychological principles that produce judgment biases and cognitive illusions. Prerequisite: elementary concepts of probability or statistics.

3 units, Win (A. Tversky) MWF 1:15-2:30


3 units, Win (Zajonc) TTh 10:30-11:45

160. Experimental Methods in Cognitive Science — 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, Win (Gabrieli) TTh 2:15-4:15 alternate years, not given 1995-96


3 units, Aut (Rumelhart) TTh 9-10:15

164. Mathematical Representation of Structures in Psychological Data — See 218.

165. Physical Sciences and Mental Laws — (Graduate students register for 265.) The possibility of mental laws partaking of the mathematical elegance and universality of physical laws. The source of such laws in well-known universal features of space, time, and the physical world internalized over evolutionary history. Recommended: interest in formal training in physics and mathematics.

1-3 units, Win (R. Shepard) MWF 11

166. 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. Prerequisite: 102.

1-2 units, Win (Heeger) M 4-6

167A. Peer Counseling: Bridge Community — Instruction in peer counseling. Topics: verbal and non-verbal skills, the use of open and closed questions, paraphrasing, working with feelings, summarization, and integration. Instruction through lectures, individual training, group exercises, roleplay practice with optional video feedback. Sections discuss topics of relevance to crisis counseling and student life. Guest speakers from University and community agencies. Students develop and apply skills in a variety of settings in the University.

2 units, Aut, Win, Spr (D'Andrea, Staff) M 3:15-5:05 plus one evening section

167B. Peer Counseling: Chicano Community — Instruction in basic counseling. Topics: verbal and non-verbal attending and communication skills, the use of open and closed questions, working with feelings, and summarization and integration. Also, 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.

2 units, Aut, Spr (Martinez) M 3:15-5:05 section by arrangement

167C. 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.

2 units, Aut (Edwards, Hoskins) M 3-4, W 4-5

167D. Peer Counseling: Issues in Sexual Health and Contraception — Provides knowledge of methods of contraception, sexually transmitted diseases, and related issues about sexual health, 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 (Schupay) T 7-10 p.m.
167F. Peer Counseling: Introduction to Asian American Psychology — Companion to 167A. Peer counseling skills not covered. 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.

2 units, Aut (Huang) W 3:15-4:45

169. Statistics for Social Scientists — (Enroll in Economics 80, Statistics 190.)

3-5 units, Aut (Wynner)
Win (Staff)

171. 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) M 2:15-4

173. Undergraduate Seminar: Infancy Research — For students involved in research on infant development. Prerequisites: 130, 132.

3 units (A. Fernald) not given 1994-95

174. The 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) MW 2:15-3:30

175. 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 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 60, or consent of instructor.

4 units, Win (Ross) TTh 1:15-3:05

176. Psychophysiology — See 236.

3 units, Aut (Gross)

177. Social Psychology of Physical Deviance and Disability — (Same as Human Biology 177.) Issues faced by the disabled and the physically deviant. Focus: interaction problems (short term and long term). Emphasis is on experiences of disabled persons in situations of everyday life.

3 units, Aut (Hastorf, Scott) TTh 11-12:15

179. 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, even our 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 1995-96

180. Undergraduate Seminar: Selected Topics in Psychology — (Refer to quarterly Time Schedule for seminar listings.)

180A. HIV/AIDS Training Education (Project SAVE: Stanford AIDS/HIV Volunteer Educators) — Project SAVE is designed to increase students' knowledge about HIV disease, transmission, and prevention, and its psychosocial, legal, and ethical implications. Instructors and guest speakers provide a thorough overview of HIV/AIDS issues in our society. Students develop training and presentation skills which are applied to conducting HIV educational presentations and campus projects (Stanford AIDS/HIV Awareness Week, community workshops).

2 units, Win (Pertofsky) Th 3:15-5

180B. Alcohol Responsibility Education — The Freshman Alcohol Responsibility and Management (FARM) course is designed to increase students' knowledge about risks associated with the use of alcohol, and risk reduction strategies (personal, social, and environmental), and to develop personal communication and training skills to be able to conduct "Alcohol Management" presentations and workshops for freshman and other students new to Stanford University.

2 units, Aut (Lenox) Th 7-9
and by arrangement

181B. Dynamics of Time Perspective — Analysis of the ways in which individual differences in time perspective influences emotions, motivation, cognitive functioning, and the range of behavioral choices. The origins, correlates, and consequences of biased time perspectives. Research teams design, execute, analyze, and write an original investigation on the topic.

3-4 units, Spr (Zimbardo) MW 1:15-3:05

181C. Studies of Animal Behavior — (Same as Human Biology 96E) Animal behavior offers insights about evolutionary adaptations. Seminar on the origins of the study of animal behavior and its development to the present. Discussion of original research papers. The use and misuse of parallels between animal and human behavior. Possible field trip to observe animals in their natural habitat.

3 units, Win (R. Fernald) W 3:15-5:30
181E. Biology and Culture in Language Development — (Same as Human Biology 96L) Do humans have an "instinct" for language, or is language a complex cultural artifact acquired by means of general learning mechanisms? The debate by researchers in language development, neurobiology, psycholinguistics, and anthropology. Topics: language acquisition in children, linguistic abilities in apes, biology of language disorders, evolution of speech and language, and the role of culture in language development.

3 units, Spr (A. Fernald) Th 3:15-5:30

182. Senior Honors Seminar — Limited to students in the senior honors program. Autumn Quarter: students participate in a weekly seminar concerned with methods and approaches to psychological research and initiate an independent research project under the supervision of an appropriate faculty member. Winter, Spring Quarters: complete the research and write the thesis. Students present their completed projects at a convention near the end of Spring Quarter.

4-12 units, Aut (B. Tversky) T 3:15-5:05 Win, Spr (B. Tversky) by arrangement

184A,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. No previous experience required, but internships demand a commitment of time and energy of 8-12 hours per week for two consecutive quarters. Weekly seminar explores diversity of clinical opportunities and specific therapeutic techniques.

1-5 units, Aut, Win, Spr (Carlsmith) T 1:15-2:30 and by arrangement

185A,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 three hours weekly, keep an ongoing journal, and participate in a final group or individual action project.

3 units, Aut, Win, Spr (Carlsmith, Wright) Th 7:30-9:30 p.m. and by arrangement

188. Reading and Special Work — Independent study. Can be repeated for credit. Prerequisite: consent of instructor.

1-3 units, any quarter (Staff) by arrangement

189. Behavioral Endocrinology — (Same as Human Biology 189.) Behavioral and environmental influences on endocrine regulation, particularly hormones related to responses to stress. The basic endocrinology and neuroendocrine regulation of stress-related hormones. Emphasis is on the interaction of psychological variables and the activity of the pituitary-adrenal system. Also, a detailed examination of the concepts of stress and coping from a theoretical perspective. Prerequisites: Human Biology core, or consent of the instructor.

3 units (Levine) alternate years, given 1995-96

190. Early Experience — (Same as Human Biology 143.) Experimental literature related to the effects of pre- and postnatal environmental factors on development and adult function. Animal and human research, and behavioral and psychological function. Prerequisite: Human Biology core or consent of instructor.

3 units, Win (Levine) TTh 4:15-5:30 alternate years, not given 1995-96

191. Undergraduate Seminar: Personal and Social Change — Analysis of social cognitive approaches to personal and social change. Applications to the modification of psychological dysfunctions in familial, educational, and organizational settings. Ethical and value issues in behavior change. Prerequisites: Human Biology core or consent of instructor.

3 units, Spr (Bandura) M 1:15-3:05

192. Undergraduate Seminar: 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, institutionally sanctioned violence, terrorism, psychological mechanisms of moral disengagement, and legal sanctions and deterrence doctrines. Prerequisite: 121.

3 units, Win (Bandura) T 1:15-3:05


3 units (Pratto) alternate years, given 1995-96

194. Undergraduate Seminar: Development of Children’s Knowledge about the Mind — (Graduate students register for 294.) Prerequisite: consent of instructor.

3 units (Flavell) not given 1994-95
195. Language and Deception—Seminar on 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: 146 or Linguistics 1 or Philosophy 181.

3 units, Win (H. Clark) TTh 3:15-4:30

196. Undergraduate Seminar: Sports Psychology—Survey of major issues in sports psychology. Topics: motor learning, anxiety, motivation, self-efficacy, and leadership as they relate to sports performance. Imagery, concentration, relaxation, and other clinical techniques that relate to peak athletic performance. Prerequisites: 1, 60.

3 units (Leland) alternate years, given 1995-96

198. Undergraduate Topical Seminar on the Psychology of Gender—(Graduate students register for 238; same as Feminist Studies 186.) In-depth coverage of a specified topic related to psychology of gender. Prerequisite: 116.

3 units (Carstensen) not given 1994-95

199. The Psychology of Mind Control—Analysis of psychological phenomena in which central aspects of individual functioning undergo dramatic reorganization: attitude and value change, religious conversion. Focuses on techniques (hypnosis, “love-bombing,” sensory deprivation), agents of persuasion (charismatic leaders, supersalesmen, therapists, gurus), contexts (total environments, “normal appearances”) and vulnerabilities of target populations. Goal is to design effective resistance strategies. Prerequisite: 1.

5 units, Win (Zimbardo) MWF 2:15-3:45

PRIMARILY FOR GRADUATE STUDENTS

Undergraduate students admitted only by consent of instructor.


1-3 units, Aut (Rumelhart) MW 9-10:15


1-3 units (Gabrieli) alternate years, given 1995-96

203. Perception—Topics in visual and auditory perception, emphasizing quantitative and physiological approaches.

1-3 units (Wandell) alternate years, given 1995-96

204. Social Psychology—Prerequisite: 121 or graduate standing in Psychology.

1-3 units, Spr (M. Lepper, Ross) TTh 3:15-5

205. Developmental Psychology—Prerequisite: graduate standing in psychology or consent of instructor.

3-4 units, Win (Zimbardo, Nolen-Hoeksema, Rosenhan) M 3:30-6 alternate years, not given 1995-96

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 and learning and memory, and hormonal and neurochemical aspects of stress and motivation.

1-3 units, Spr (Wandell, Wine) TTh 1:15-2:30 alternate years, not given 1995-96

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 (Markman) TTh 10-12

210. Memory and Learning—Survey of 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) MW 10:30-12

211. Personality—Survey of theory and research in personality. Prerequisite: graduate standing in psychology.

2-3 units, Win (Nolen-Hoeksema, Rosenhan) M 3:30-6 alternate years, not given 1995-96

212. Social Psychology—Prerequisite: 121 or graduate standing in Psychology.

1-3 units, Spr (M. Lepper, Ross) TTh 3:15-5

213. Abnormal Psychology—Literature in abnormal psychology 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) TTh 9-10:20
218. Mathematical Representation of Structures in Psychological Data — (Undergraduates register for 164.) Theory and methods of multidimensional scaling, hierarchical clustering, and related methods for discovering and representing structures underlying matrices of similarity and multivariate data. Prerequisite: graduate standing in psychology or consent of instructor.
* 1-3 units, Spr (R. Shepard) MWF 11

219. Graduate Seminar on Selected Topics in Cognition — Prerequisite: consent of instructor.
* 1-3 units, Aut (B. Tversky) W 1:15-3

220. Graduate Seminar: Special Topics in Cognitive Development — Prerequisite: graduate standing in psychology or consent of instructor.
* 1-3 units (Markman) alternate years, given 1995-96

221. Applications of Vision Science — Aspects of human vision relevant to the design and control of color imaging devices (displays, printers, cameras, and scanners). Topics: human optics, spatial resolution, color-matching, pattern vision, color appearance, and motion. Topics in imaging (digital halftoning, color calibration, and the analysis of flicker and motion artifacts). Recommended: some background in perception, linear algebra, and computation.
* 1-3 units, Spr (Wandell) TTh 9:30-10:45

225. Psychology and Law — (Same as Law 345.) See description 125.
* 1-4 units, Aut (Rosenhan) TTh 1:45-3
  plus section T 12:40-1:40

226. Culture and Self — (Undergraduates register for 126.) 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) MW 1:15-2:30
  alternate years, not given 1995-96

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 1995-96

228. Ion Transport and Intracellular Messengers — See 114.
* 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.
* 3 units (Staff) alternate years, given 1995-96

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 theory 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 1994-95

234. The Affective Disorders — See 134.

235. Seminar in Multicultural Counseling — (Same as Education 233.) How the New World experience has affected the adaptive strategies, acculturation patterns, family structure, and support systems of African Americans, American Indians, Asian/Pacific Islanders, and Hispanic Americans. Analyses of the theory and practice of cross-cultural counseling, the cultural appropriateness of present mental health service delivery approaches, alternatives to individual counseling interviews, and the process of culturally adapting counseling interventions. Emphasis on cross-cultural counseling competence with ethnic minorities.
* 1-3 units, Spr (LaFromboise) M 1:15-3:05
  and by arrangement

236. Psychophysiology — (Undergraduates register for 176.) Advanced seminar. Overview of psychophysiology. Topics: concepts in psychophysiology, electricity and the nervous system, electrophysiological activity and measurement, cardiovascular activity and measurement, lie detection, biofeedback, and emotion. Lab demonstrations. Critical thinking skills are emphasized. Undergraduate prerequisite: consent of instructor.
* 1-3 units, Aut (Gross) Th 3:15-5:05

237. Career and Personal Counseling in Culturally Diverse Settings — (Same as Education 234.) Design and implementation of career counseling interventions based on cross-cultural perceptions and definitions of career competence, career development theories, and appropriate counselor behavior. Case studies of bicultural role conflict in work settings. Prerequisite: graduate student.
* 1-3 units, Aut (Krumboltz) M 3:15-5:05
  and by arrangement
238. Seminar on the Psychology of Gender — See 198. Prerequisite: graduate standing in psychology.
1-3 units (Carstensen) not given 1994-95

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 (Flavell) not given 1994-95

240. Language Acquisition I — (Enroll in Linguistics 240.)
4 units, Aut (E. Clark)

241. Language Acquisition II: Meaning — (Enroll in Linguistics 241.)
4 units (E. Clark)
alternate years, given 1995-96

242. Conceptual Organization and Development — (Undergraduates register for 143.) 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, Spr (Markman) TTh 3:15-4:30 alternate years, not given 1995-96

243. General Development Seminar — Prerequisite: consent of instructors.
1-2 units, Win (A. Fernald, Flavell, Markman) by arrangement

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 on environmental factors that influence the aging process. Prerequisite: graduate standing in psychology or consent of instructor.
1-3 units (Carstensen) not given 1994-95

248. Introduction to Test Theory — (Same as Education 252.) 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.
3-4 units (Haertel) not given 1994-95

249A. Problems in Measurement: Item Response Theory — (Same as Education 353A.) 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: 248 and 252, or Education 252 and 257, or equivalent.
3 units, Aut (Haertel) MW 9-10:30 alternate years, not given 1995-96

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) alternate years, given 1995-96

252. Statistical Methods for Behavioral and Social Sciences — (Undergraduates register for 152.) 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, and 191X; Statistics 190. 3-6 units, MWF 11-12:30 plus section by arrangement

253. Statistical Theory, Models, and Methodology — (Undergraduates register for 193.) Practical and theoretical study of advanced data analytic techniques such as signal detection, profile, trend, factor, and discriminant analysis, and multivariate analysis of variance. Students analyze data and write a research report weekly. Lab required. Prerequisite: 252 or Education 257.
1-3 units (Thomas, Pratto) not given 1994-95

255. Graduate Seminar: Selected Topics in Personality and Abnormal Psychology — Prerequisite: consent of instructor.
1-3 units, Aut (Horowitz) by arrangement

256. Decision and Judgment — For graduate students. See 156.

257. Individually Supervised Practicum — Can be repeated for credit. Prerequisites: graduate standing in psychology and consent of instructor.
3-5 units, Aut, Win, Spr (Staff) by arrangement

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, Win, Spr (Ross)

1-3 units, Win (Zajonc) TTh 10:30-11:45

1-3 units (Rumelhart) alternate years, given 1995-96

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 (Greeno) not given 1994-95

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: 141, 201, or consent of instructor.
1-3 units (Gabrieli) alternate years, given 1995-96

263. Physical Sciences and Mental Laws — See 165.

264. Selected Topics in Human Learning — Recent empirical and theoretical analyses of verbal learning, learning from text, learning of concepts, and intellectual skills. Emphasis 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 (Bower) by arrangement

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, Win (Rumelhart) W 12-3 alternate years, not given 1995-96

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.
1-2 units, Aut, Win, Spr (Heeger) M 4-6

267. Vision and Image Processing Laboratory — Through lectures and hands-on experience with a computer, explores image processing, human and computer vision, and computer graphics. Topics: image representation and image coding, sampling and filtering, motion analysis, color.
1-3 units, Aut (Heeger) MW 11-12:15

268. Psychophysics and Cognitive Psychology for Musicians — (Same as Music 151.) 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.
1-3 units, Aut (Chowning, Cook, Matthews, Pierce, R. Shepard) Th 9-10:50

269. Graduate Seminar in Personality Research — Can be repeated for credit. Prerequisite: graduate standing in psychology.
1-2 units, Aut, Win, Spr (Nolen-Hoeksema) by arrangement

270. Culture, Gender, and Race — Cognitive theories in social psychology and their social-political implications. Readings on basic social psychological literature and additional articles from other social sciences and the humanities. The central, identifying, dimension of social psychological analysis and its relevance to social intervention and social policy. Other topics: the relation of the cognitivist and subjectivist traditions in social psychology to the postmodernist revolution, the status of the self as a psychological and political construction, and the role of gender, race, and culture in social perception and self perception.
1-3 units, Aut (Chowning, Ross) not given 1994-95

271. Applications of Social Psychology — See 175.

272. Special Topics in Psycholinguistics — May be repeated for credit. Prerequisite: consent of instructor.
1-3 units, Win (H. Clark)

274. Selected Topics in Judgment and Choice — Seminar addresses current research topics in the study of judgment and choice, including the determinant of confidence, the effect of context, the resolution of intrapersonal conflict, and the role of framing. Prerequisite: graduate standing in psychology or consent of instructor.
1-3 units, Aut (A. Tversky) T 4-5:30
275. Graduate Research—Research of intermediate nature; undertaken with members of departmental faculty. Prerequisite: consent of instructor.
  1-3 units (Staff) by arrangement

278. Graduate Seminar: Internal Representation—Can be repeated for credit. Prerequisite: consent of instructor.
  1-3 units (R. Shepard) not given 1994-95

279. Theoretical Approaches in Social Psychology—See 179.
  1-3 units (Steele) alternate years, given 1995-96

280. Doctoral Research—For dissertation. Prerequisite: consent of instructor.
  1-15 units (Staff) by arrangement

281. Practicum in Teaching—Enrollment limited to students in psychology who has research proposal for the class. Prerequisites: graduate student in psychology or undergraduate who has taken 121; consent of instructor.
  1-3 units (Pratto) alternate years, given 1995-96

283. Interdisciplinary Seminar on Conflict Resolution—(Same as Economics 386, Law 325, Operations Research 366.) 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, Tversky, Wilson) T 4:10-5:30

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, Aut, Win, Spr (Staff) by arrangement

290. Law and Social Science—(Same as Law 229.) Viewing social science as an analytic tool, examines its role in American legal process. Focuses on the relevance of social science theory and empirical finding for such issues as copyright, desegregation, deterrence, human responsibility, fair employment, and jury dynamics. The nature of expertise, and its relevance to these matters. Emphasis on scientific method and its relevance to legal analysis.
  1-3 units (Rosenhan) not given 1994-95

292. Social Cognition—The history of "cognitive" approaches in social psychology and recent findings in areas of "social cognition," including categorization and stereotyping, attention, impression formation, person memory, attitudes, automaticity, mood effects, and collective mental representations. Students read a text and two to three research articles weekly and write one-page summaries to facilitate class discussions, plus a review paper or research proposal for the class. Prerequisites: graduate student in psychology or undergraduate who has taken 121; consent of instructor.
  1-3 units (Pratto) not given 1994-95

293. The Psychology of Group Relations—Seminar on theories of intergroup relations concentrating on social psychological influences (stereotyping, group identity, self-esteem, prejudice, socio-political ideology, group cohesion, and status).
  1-3 units (Pratto) alternate years, given 1995-96

294. See 194.

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 methods, 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 (Pratto, Steele) not given 1994-95

297. Seminar for Coterminal Masters’ Students—Discussion of contemporary issues and student research. Student and faculty presentations.
  1-2 units, Spr (L. Ross) F 1-3

299. Effective Teaching—Seminar designed to enhance teaching effectiveness for graduate T.A.s within the department. Covers all major topics in undergraduate education in psychology, planned and developed in conjunction with advanced-level graduate students.
  1 unit, Aut (Zimbardo, Rosenhan, Mann, Engel) W 2:3-3:30

300. Psychology and Law Proseminar—Current Stanford research on psycholegal issues. Acquaints faculty and students in the Psychology/Law program with each other’s current research and with contemporary issues in the field. Prerequisite: graduate standing in psychology or law, or consent of instructor.
  1-3 units (Rosenhan) not given 1994-95

355. Jury Decision-Making—(Same as Law 327.) Limited to Law and graduate students who have consent of instructor. Seminar examines the psychological processes regulating jury decision-making. The cognitive aspects of a presentation (the amount of information that can be retained and processed), story, and construal processes. The social psychological aspects of group decision making. Preparation for trial, including trial simulation, voir dire, and juror selection.
  1-3 units (Rosenhan) not given 1994-95
Government plays an important, ubiquitous role in contemporary society. Moreover, the growing complexity of public policies, the political processes that give rise to them, and the organizations that implement them have created a need in government, business, and the nonprofit sector for people who understand how government operates. The Public Policy Program gives students the foundational skills and institutional knowledge 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 employment as an analyst in government agencies or business, as a foundation for postgraduate professional schools in business, education, law, and public policy, and as preparation for graduate study in the social sciences, especially economics, political science, and sociology.
later than Dead Week of Autumn Quarter in the senior year.

4. Seniors are also required to participate in one quarter of the Senior Seminar (Public Policy 200). Majors also must submit to the program director 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 another course or an honors thesis.

5. A maximum of 10 units may be taken on a Satisfactory/No Credit basis only in the prerequisite courses. All other courses must be taken for a letter grade.

6. Students must complete the Public Policy core and their concentration area courses with an average letter grade indicator (LGI) of 2.0 or higher.

7. To become a major in Public Policy and to be nominated for the A.B. degree, students must complete an application, available in Building 60, room 61B. For additional information drop by or phone 415-723-3452.

The Public Policy Program offers two courses to prepare students for making effective academic use of an internship (Public Policy 179, 182). Students may also participate in the Integrated Scholar Intern Program combining directed reading and research with an internship.

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 letter grade indicator (LGI) of 3.5 in the following courses: the Public Policy core, the student’s concentration area courses, the Senior Seminar, and Public Policy 199 (credit for honors research). Courses not taken at Stanford are not included in calculating the LGI.

3. Enroll in at least 10 but no more than 15 units of Public Policy 199 during the senior year and receive a final LGI 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.

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 an LGI 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 2. 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 Friday, May 19.

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

50. Current Trends in Policy Making — Guest speakers address current policy issues (the environment, health care, education, and the budget). Discussions about these policies, stressing interactive learning that puts students in the positions of the policy makers.

3 units, Spr (Brady, Cogan, 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 formu-
lated and implemented. The results of this process using equity and efficiency criteria. Prerequisite: Political Science 1 or 10.
5 units, Spr (Brady)

102. Organizations and Public Policy — (Same as Sociology 166.) 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. Prerequisite: Industrial Engineering 100 or Sociology 160.
5 units, Win (Scott)

103A. Introduction to Political Philosophy — (Same as Philosophy 30.) Introduction to some fundamental issues of political life. Why do laws have authority? Can it be fair for some people to be wealthier than others? How free should society be? Do we need a government at all? Questions explored through a careful reading of the classic texts in political philosophy, from the 4th century B.C. to the present. DR:8(3)
5 units, Win (Satz)

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. A Writing Across the Curriculum course. DR:8(3)
5 units, Win (Satz)

103C. Introduction to Moral Theory — (Same as Philosophy 20.) Classic questions in moral philosophy through the works of traditional and contemporary authors. Readings: Aristotle, Hume, Kant, Mill, and Plato. Topics: What is the basis of our judgments of right and wrong, and good and evil? Society’s rules? God’s commands? Our emotions? Reason? Which actions are right? What sort of person is it best to be? What is the role of happiness in a good life? DR:8(3)
5 units, Aut (Cohon)

104. Economics and Public Policy — (Same as Economics 150.) The relationship between economic analysis and economic policies. Economic rationales for public policies, methods and techniques of policy evaluation and the role of benefit-cost analysis, economic models of political processes and their connection to the analysis of economic policy—making, and the relationship of income distribution issues to policy choice. How economic analysis is done, and why the political process regards it as useful but not as necessarily determinative of policy choices. Readings: the theoretical foundations of economic policy analysis and policy decisions, and the analysis of the adoption and implementation of programs in a variety of public policy areas. Writing Focus course. Prerequisites: Economics 51, 52 (52 may be taken concurrently).
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, Statistics 61 or Economics 102.
5 units, Spr (Rothwell)

127. Economic Transition in Eastern Europe — Current issues in the transition from centrally planned to market economies, examining the economic principles underlying the successes and failures in privatization, price liberalization, and market reforms. Systems of central planning and early attempts at reform. Applying microeconomic principles related to asset ownership, the structure of organizations, incentives, and the credibility of reform. Prerequisite: Economics 51.
5 units, Spr (Fleck)

179. Preparation for Internship Learning — Provides students with the knowledge and skills necessary for effective learning through an internship. Focus is on identifying and negotiating internship assignments which yield effective service and substantive learning appropriate to students' academic interests. Introduction to the theory and practice of self-directed "field" learning (e.g., clarifying goals and objectives, critical reflection on experience, problem-solving, assessing experiential learning, and understanding the interplay between experience and analysis in field research). If appropriate, students are placed with faculty who serve as sponsors of internship-related directed study.
3 units, Win (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 “nonmarket 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, Win (Kessler)

196. The Political Economy of the Federal Budget — Applies the tools of economics and political science 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 policymaking; spending programs (Social Security, Medicare, welfare, and infrastructure programs). Prerequisites: Economics 51, 52 (Economics 52 may be taken concurrently), Political Science 1. 5 units, Win (Cogan)

198. Directed Readings in Public Policy 1—5 units (Staff) by arrangement

199. Honors Thesis 1—10 units (Staff) by arrangement

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 (Fleck)
200B. 3 units, Win (Rothwell)
200C. 3 units, Spr (Fleck)

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, Aut (Bueno de Mesquita)

RELIGIOUS STUDIES

Emeriti: (Professors) Edwin M. Good, David S. Nivison (Asian Languages, Philosophy, Religious Studies)

Chair: Lee Yearley

Professors: Bernard R. Faure, René Girard (French and Italian, by courtesy, Religious Studies), Van A. Harvey, Lee Yearley

Associate Professors: Carl W. Bielefeldt, Arnold M. Eisen, Hester G. Gelber

Assistant Professors: Alice Bach (on leave Autumn, Winter), Rudy V. Bustos, Howard Elberg-Schwartz (on leave), Philip J. Ivanhoe (Philosophy and Religious Studies), Timothy P. Jackson

Professor (Teaching): Robert C. Gregg (Classics and Religious Studies)

Lecturer: Theodore Foss

Acting Assistant Professor: Robert Royalty

Visiting Professor: Frits Staal

Visiting Associate Professor: Daniel Matt (Winter)

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.

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
HONORS PROGRAM

Majors in Religious Studies should consider the possibility of writing an honors essay in Religious Studies. This essay may be on any approved topic in Religious Studies or, in special cases, interdisciplinary. The honors essay is expected to be approximately 40 pages in length and can represent as much as 10 units of work in the senior year.

Students wishing to take honors in Religious Studies should consult with the undergraduate director by the beginning of the Winter Quarter of the junior year so as to take advantage of courses relevant to the proposed research. Prior to this consultation, the student should have explored possible topics with members of the faculty expert in the field of interest.

Upon approval by the undergraduate director, the student enrolls for 2 units of credit in Religious Studies 198 in Spring Quarter of the junior year to develop, under supervision of a department faculty member, a detailed honors essay proposal with a preliminary bibliography of works to be 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.

Each major is encouraged to write a senior essay in his or her concentration. The essay provides the opportunity for a sustained treatment of a specific topic central to the student's interests. Research for and writing of the essay, if chosen, will count as a 5-unit course to be credited toward the required 60-unit department total, as well as toward the 25-unit concentration total.

GRADUATE PROGRAMS

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.

DOCTOR OF PHILOSOPHY

University regulations regarding the Ph.D. are found in the "Advanced Degrees" section of this bulletin. The following requirements are in addition to the University's basic requirements.

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.
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 90 units of graduate course work (excluding the dissertation) of which the last 72 units must be taken at Stanford.

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, faculty course evaluations, an exam, 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. Students who entered 1992 and later have an alternate requirement.

Qualifying Examination—To qualify for writing a dissertation, the student must successfully pass a comprehensive examination in the chosen field, the area of specialization, and the discipline of religious studies.

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.

COURSES

Course levels:
1-89 Introductory (4 or 5 units)
101-189 Topics in Religion (4 or 5 units)
197-199 Undergraduate Directed Reading (variable units)
201-289 Seminars for Undergraduates and Graduates (5 undergraduate units or 4 graduate units)
299 Graduate Directed Reading (variable units)
301-399 Graduate Seminars, Research, and Teaching (variable units)

RELIGIOUS TRADITIONS

ASIAN RELIGIONS

11. Religious Classics of Asia — S. Asian texts, contexts and nontexts from the Vedas, Buddhism, Advaita Vedanta, and Tantrism. Limited enrollment. DR:2(*) or 8(3*)
4 units, Aut (Staal)

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. DR:2(*) or 8(3*)
4 units (Faure) not given 1994-95

17. Introduction to Hinduism: Between Asceticism and Devotional Love — The multiple traditions of Hinduism (Vedic, ascetic, devotional and popular) as reflected in its basic texts and practices. The distinguishing features of Hinduism such as transmigration, karma, the cycle of lives, dharma, and liberation.
4 units, not given 1994-95
18. Zen Buddhism — Introduction to Zen Buddhist religious thought, focusing on selected issues in several representative texts. DR:2(*) or 8(3*)

4 units, Win (Bielefeldt)

20. Chinese Religious Thought and Practice — Introduction to the religious traditions of China, emphasizing Buddhism and Taoism. DR:2(*)

4 units (Faure) not given 1994-95

55. Introduction to Chinese Thought — (Same as Asian Languages 46, 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 uncommon and often contradictory answers to a common set of problems. Limited enrollment. DR:2(*) or 8(3*)

4 units (Faure) not given 1994-95

116. Japanese Buddhism — History and teachings of Buddhism in Japan, emphasizing the early and medieval periods. DR:2(*)

5 units, Spr (Bielefeldt)

117. Syncretism and Sectarianism in Chinese Buddhism — Dialectical relationships between sectarian and syncretic tendencies, conservative and subversive elements, and orthodoxy and heterodoxy in development of Chinese Buddhism. Prerequisite: consent of instructor.

5 units (Faure) not given 1994-95

118. Ritual in East Asian Buddhism — Rituals and symbolic representations of the relationship between sacred and profane in E. Asian religious traditions.

4 units (Faure) not given 1994-95

119A. Neo-Confucianism — (Same as Asian Languages 231, Philosophy 114.) Introduction to later Confucian thought as represented in the Song through Qing dynasties. 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 (Ivanhoe) not given 1994-95


5 units (Bielefeldt) not given 1994-95

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 1994-95

150. Systems of Buddhist Thought — Introduction to the Lotus school of Mahayana; its Indian sources, Chinese formulation, and Japanese developments.

5 units (Bielefeldt) not given 1994-95

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 1994-95

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 1994-95

211. Philosophical Texts of the Ming Dynasty — (Same as Asian Languages 232, Philosophy 211.) Primary text: Huang Zongxi’s Mingru xuean, a history of Ming Dynasty philosophers. Focuses on structure and theory of organization and approach to text. Additional readings from Wang Yangming and Li Zhi. Prerequisite: reading knowledge of classical Chinese.

5 units (Ivanhoe) not given 1994-95

212. Interpreting Confucian Texts — (Same as Asian Languages 230, Philosophy 212.) Illustrates 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, Spr (Ivanhoe)

221. Ch’ an/Zen and Local Religion — Relationships between 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 1994-95

230A. Zen Buddhism Seminar — Selected topics in Ch’an and Zen; may be repeated for credit.

5 units (Bielefeldt) not given 1994-95

258. Japanese Buddhist Texts — (Same as Asian Languages 258.) Readings in medieval Japanese Buddhist materials. Prerequisite: background in Japanese and/or Chinese.

5 units, Spr (Bielefeldt)
interaction with other religions. Thematic interest in debates about orthodox and heretical teaching, and Christianity's modes of community organization, surviving art/architecture examines early other groups and among Christians. Study of primary documents (ancient texts in translation) and beliefs/practices that distinguished Christians from other groups — (Same as Classics 104.)

142. Early Christianity — (Same as Classics 104.) The Christian movement to 500 A.D. and emergent themes found in the biblical books of Exodus, Judges, and Samuel. Interrelationship of power struggles between the human and the divine; historical clashes between Israel and its ancient neighbors. Study of Moses as reluctant prophet, David as ambitious king. Emphasis on the nature of Israel's political community and the relations between power and authority, political and sacred order. Four evening films. DR:7(2) or 8(3)

144. Protestantism — Development of Protestantism from Reformation to the present. 5 units (Harvey) not given 1994–95

146. Christian Fundamentalisms — Considers the diversity of Evangelical traditions in the U.S. Readings in the history, theology, and cultures of Evangelical Christians from diverse points of view. 4 units, Spr (Busto)

234. The Virgin Mary and Images of Power — (Same as Feminist Studies 150.) 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 on the Middle Ages. 5 units, Aut (Kelber)

235. Buddhist Studies Proseminar 5 units (Bielefeldt) not given 1994-95

CHRISTIANITY

24. Introduction to Christianity — Historical development of Christianity from its origins to the present, showing how Christians have understood themselves as members of Christian communities. Primary source texts are basic to understanding the varieties of Christianity: e.g., excerpts from Paul's epistles, the Benedictine Rule, Calvin's Institutes, the Book of Mormon, and liberation theology. DR:8(3)

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.

26. Model Selves: Francis of Assisi — Formation of 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 (Kelber) not given 1994–95

47. Modern Christian Thought — The origins and development of Protestant "Neo-orthodox" theology from Barth's Romerbrief to Tillich's Systematic Theology. 5 units, not given 1994–95

107. Conversion and Identity: Ancient Practice and Modern Theory — (Same as Classics 107.) The dynamics of religious and philosophical conversion, as seen in Greek, Roman, Jewish, and early Christian literary sources, involve aspects of change that are personal, cultural, and social. Ancient narrators' accounts of their (or others') conversions, read on their own terms and in the light of studies of the phenomenon of "turning-to" a new faith, philosophy, or ideology, recently produced and drawing from history, religion, theology, sociology, anthropology, psychology.

145. Protestantism — Development of Protestantism from Reformation to the present. 5 units (Harvey) not given 1994–95

146. Christian Fundamentalisms — Considers the diversity of Evangelical traditions in the U.S. Readings in the history, theology, and cultures of Evangelical Christians from diverse points of view. 4 units, Spr (Busto)

234. The Virgin Mary and Images of Power — (Same as Feminist Studies 150.) 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 on the Middle Ages. 5 units, Aut (Kelber)

268. Model Selves: Francis of Assisi — Formation of 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 (Kelber) not given 1994–95

273. Aquinas' Ethics — (Same as Philosophy 120/220.) 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 1994–95

274. C. Kierkegaard — (Same as Philosophy 130/230.) Examines Soren Kierkegaard's major works. 5 units (Harvey) not given 1994–95

JUDAISM

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. Interrelationship of power struggles between the human and the divine; historical clashes between Israel and its ancient neighbors. Study of Moses as reluctant prophet, David as ambitious king. Emphasis on the nature of Israel's political community and the relations between power and authority, political and sacred order. Four evening films. DR:7(2) or 8(3)

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. DR:8(3)

4 units, Aut (Eisen)
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. DR:3 or 8(3)
   4 units, Win (Eisen)

   5 units (Eilberg-Schwartz) not given 1994-95

128. Women and Judaism — 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. DR:
   5 units (Eilberg-Schwartz) not given 1994-95

161. Modern Jewish Thought
   5 units, not given 1994-95

166. Myth and Ritual in Judaism — Reconsideration of major practices and beliefs of ancient Judaism from the perspectives of symbolic, cultural, and structural anthropology. Dietary restrictions, circumcision, sacrifice, menstrual laws, rules of impurity. DR:8(3)
   5 units (Eilberg-Schwartz) not given 1994-95

   5 units (Eilberg-Schwartz) not given 1994-95

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 1994-95

260. Contemporary Jewish Thinkers — Close readings of Jewish religious thought of the past 10 years in Israel, America, and Europe. Prerequisite: consent of instructor.
   5 units (Eisen) not given 1994-95

281. Encounters Between Modern Philosophy and Judaism
   5 units (Eisen) not given 1994-95

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ETHICS AND PHILOSOPHY OF RELIGION

42. Philosophy of Religion — (Same as Philosophy 42.) 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. DR:8(3)
   5 units, Aut (Gelber)

113. Zhuang Zi — (Same as Philosophy 113, Asian Languages 113.) 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 1994-95

150. Systems of Buddhist Thought — Introduction to the Lotus school of Mahayana; its Indian sources, Chinese formulation, and Japanese developments.
   5 units (Bielefeldt) not given 1994-95

162. Ethics, “Abominations,” and “Liberations” — What moral abominations and liberations are and whether the particular practices examined qualify as instances. Focuses on gay liberation, the Holocaust, and abortion.
   5 units, Spr (Jackson)

164. Morality of Peace and War — (Same as Philosophy 174A.) Moral, political, and religious issues surrounding conflict and conflict-resolution, especially in a nuclear age. General nature of peace and war, their theory and practice; just war tradition and pacifism; women and war. DR:8(3)
   5 units (Jackson) not given 1994-95

   4 units (Gelber) not given 1994-95

168. Divine Justice in Medieval Thought and Literature — Medieval ethical beliefs studied through legends, myths, saints’ lives, literature, and the ethical theories of Medieval scholars.
   4 units (Gelber) not given 1994-95

174. From Kant to Kierkegaard — Survey of main currents of theology and religion in Germany, emphasizing themes of the knowledge of God and the problem of alienation.
   5 units (Harvey) not given 1994-95
174D. Friedrich Nietzsche—Exploration of his writings, emphasizing his views on religion. Prequisite: consent of instructor.  
5 units (Harvey) not given 1994-95

177. Religious Existentialism—Introduction to the influence of existentialism on religious thought since Kierkegaard.  
5 units, Aut (Harvey)

182. Modern Moral Issues—Nature of ethical reasoning (Christian and secular); examination of political violence, human sexuality, and abortion. Topics: just war theory, pacifism, capital punishment; sexual orientation, promiscuity, rape, monogamy; and pro-life and pro-choice positions.  
5 units (Jackson) not given 1994-95

5 units (Bach) not given 1994-95

266. Medical and Legal Ethics—Investigates ethical problems and assumptions of medicine and law, adopting a "principles and cases" approach and interrelating the concerns of the two professions. Topics: euthanasia, abortion, informed consent, paternalism, justification of punishment, problems with an adversarial system of justice, confidentiality, and conflict of interest. The nature of personal integrity and the place of authority in a liberal society.  
5 units, Spr (Jackson)

5 units, Spr (Jackson) not given 1994-95

274A. Sigmund Freud  
5 units (Yearley) not given 1994-95

274D. Nietzsche's Zarathustra  
5 units (Yearley) not given 1994-95

275. Love and Justice—Philosophical and theological accounts of love and justice, emphasizing how they relate to self-sacrifice, equality, violence, and human finitude/vulnerability. Is love ideally indiscriminate and therefore antithetical to justice? Is justice a single virtue equally binding on all human beings? How are we to conceive (and act on) related values like rationality, human rights, and civil liberties? Authors: Plato, Rawls, Shklar, and Nussbaum.  
5 units, Win (Jackson)

5 units, Spr (Harvey) not given 1994-95

5 units, Spr (Harvey)

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, Spr (Yearley)

RELIGION, CULTURE, AND COMPARATIVE STUDIES

1E. Eastern and Western Conceptions of the Self—(Same as Philosophy 41.) Analysis and comparison among models of the self in various traditions, notably classical Greek, Christian, Confucian, Buddhist, Taoist, and Freudian. Limited enrollment. DR:2(*) or 8(3*)  
5 units (Yearley) not given 1994-95

5 units (Eilberg-Schwartz) not given 1994-95

7. American Indian Religions—Basic themes in the beliefs and traditions of Indian peoples. Reconsideration of how American Indians have been studied. Cultural conflict and exchange among Indian peoples, Mexicans, Europeans, Africans, and Americans.  
4 units (Busto) not given 1994-95

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. DR:3† or 8†(3)  
5 units, Spr (Busto)

110. God and the Big Bang—The Jewish mystical tradition and its interface with contemporary cos-
mology, focusing on selected texts from Kabbalah and Hasidism.
4 units, Win (Matt)

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. DR:7†(2) or 8†(3)
5 units (Bach) not given 1994-95

134. Reading the Feminine in Ancient Near Eastern Texts — The connections between religion and gender in the foundational Western texts of the Sumerian, Babylonian, Canaanite, and Israelite traditions, focusing on the divine realm and the secular world. Emphasis is on literary analysis of ancient religious myths and epic texts. Images of male and female deities in literary and visual images.
4 units, Spr (Bach)

143. Introduction to Chicano Life and Culture — (Same as Chicano Studies 110, Spanish 180.) Interdisciplinary examination of the history and culture of Mexicans in the U.S. Emphasis is on literature and religious studies. DR:3
5 units, Aut (Busto, Yarbro-Bejarano)

148. Social Theory and Religion 5 units (Eisen) not given 1994–95

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 (Harvey) not given 1994–95

157. Readings in Greco–Roman Religion — Texts present philosophical and religious thought and point towards activities of discrete groups.
5 units (Gregg) not given 1994–95

163. Religion and Ethnicity — Religion and issues of race, class, and gender in the development of racially ethnic communities. Religion as promoting or resisting assimilation. Issues: revitalization, theories of liberation, dissent and transformation within traditions. DR:3†
5 units (Busto) not given 1994–95

165. Religious Ritual — Classical and contemporary theories of religious ritual with case studies from a variety of traditions.
5 units, Spr (Eisen)

171. Medieval Religious Thinkers 5 units, not given 1994–95

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.
4 units, Win (Gelber)

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, Spr (Gelber)

5 units (Faure) not given 1994–95

213. Myth in the Ancient Near East — Myth as genre; 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 1994–95

217. China and the West: Religion and Cultural Encounters — Topics in the historical exchange between China and Europe, emphasizing the cultural disciplines in the Early Modern age. The reaction and response and the generalizations and distortions of one society’s views of another.
5 units, Aut (Foss)

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 1994–95

227. Seminar: Religion and Gender — (Same as Feminist Studies 227.) “Eating Texts,” and the exploration of the interrelated literary tropes of
beautiful women, banquets, and bizarre deaths. Structuralist and postmodern literary theories of characterizations are applied to narrative works from ancient Near East, the Bible, second Temple Judaism, Greece, and Rome. Prerequisites: course in ancient texts, feminist theory, or literary theory, and consent of the instructor.

5 units (Bach) not given 1994-95


4-5 units, Aut (Royalty)

241. Asceticism in Pagan and Christian Antiquity

4-5 units (Gregg) not given 1994-95

245. Comparative Religious Ethics

5 units (Yearley) not given 1994-95


4 units (Busto) not given 1994-95

261. Modernization/Secularization — Reexamination of these two fundamental concepts in light of recent historical, sociological, anthropological, and philosophical developments.

5 units (Eisen) not given 1994-95

262. Religion and Masculinity — Investigates the way in which masculinity is constituted as a cultural and religious symbol. The role that religious symbols and practices play in the shaping of manhood, moving between ethnographic and historical literature concerning the psychological and sociological factors shaping the image of manhood.

5 units (Eilberg-Schwartz) not given 1994-95

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 1994-95

276. Topics in Race and Religion — Seminar on issues in the intersection of race and religion. Topic: religious strategies of liberation for racially ethnic communities in the U.S. Prerequisite: consent of instructor.

4 units, Win (Busto)

UNDERGRADUATE DIRECTED READING

197. Senior Essay — Prerequisite: consent of instructor and of the department.

Aut, Win, Spr (Staff) by arrangement

198. Honors Essay — Prerequisite: consent of instructor and of the department.

Aut, Win, Spr (Staff) by arrangement

199. Individual Work — Prerequisite: consent of instructor and of the department.

Aut, Win, Spr (Staff) by arrangement

GRADUATE DIRECTED READING

299. Individual Work — Prerequisite: consent of instructor.

Aut, Win, Spr (Staff) by arrangement

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, alternate years, given 1995-96

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, Aut (Harvey)

311. Buddhist Studies Seminar

5 units, Win (Bielefeldt)

314. Advanced Classical Chinese Texts — (Same as Philosophy 314.)

4 units, Aut (Ivanhoe)

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 1994-95

319. East Asian Religions — Directed research.

(Bielefeldt, Faure, Ivanhoe, Yearley)

by arrangement

321. Graduate Seminar in Modern Judaism — Prerequisite: consent of instructor.

4 units, Win (Eisen)
(Bach, Eilberg-Schwartz, Eisen, Gregg) by arrangement

339. Medieval Western Religions — Directed research.  
(Gelber, Yearley) by arrangement

369. Religion and Literature — Directed research.  
(Bach) by arrangement

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, Win (Yearley)

379. Religious Thought — Directed research.  
(Bielefeld, Eisen, Gelber, Harvey, Jackson, Yearley) by arrangement

(Eilberg-Schwartz, Eisen, Faure, Harvey, Yearley) by arrangement

390. Teaching in Religious Studies — Required supervised internship.  
4 units, Aut, Win, Spr (Staff) by arrangement

392. Candidacy Essay — Prerequisite: consent of graduate director.  
variable units, Aut, Win, Spr (Staff) by arrangement

395. Master of Arts Thesis  
2-9 units (Staff) by arrangement

CENTER FOR RUSSIAN AND EAST EUROPEAN STUDIES

Emeriti: Alexander Dallin, Joseph N. Frank, Alex Inkeles, Jan F. Triska, Joseph Van Campen, Wayne S. Vucinich
Committee in Charge: The Steering Committee on Russian and East European Studies
Director: Norman Naimark (History)
Assistant Director: Irina Barnes
Professors: Karol Berger (Music), Terence L. Emmons (History, on leave Winter), Robert Flanagan (Business), Lazar Fleishman (Slavic Languages, on leave), Gregory Freidin (Slavic Languages), David J. Holloway (Political Science), Mark Mancall (History), Ronald I. McKinnon (Economics), William Miller (Business), Norman Naimark (History), Condocezza Rice (Political Science), Henry Rowen (Business and Hoover Institution), Richard D. Schupbach (Slavic Languages), Nancy B. Tuma (Sociology, Autumn, Moscow), Steven J. Zipperstein (History)
Associate Professors: William S. Eddelman (Drama), Nancy S. Kollmann (History, on leave), Aron Rodrigue (History)
Assistant Professors: Monika Greenleaf (Slavic Languages), John Litwack (Economics), Michael McFaul (Political Science), Stephen Moeller-Sally (Slavic Languages), Yingyi Qian (Economics), Debra Satz (Philosophy), Szonja Szelenyi (Sociology, on leave Autumn)
Affiliated Professors: Donald L. Carpenter (Stanford Electronic Laboratory), Sidney Drell (SLAC), John W. Lewis (Political Science, on leave Autumn, Winter)

Lecturers: Jasmina Bojic (Slavic Languages), John B. Dunlop (Russian and East European Studies), Rima Greenhill (Slavic Languages), Katherine Jollock (History), Robert Kleiman (History), Jack Kollmann (History, and Russian and East European Studies), Lesya Maslovska-Lorentz (Slavic Languages), Patricia Mueller-Vollmer (Slavic Languages), Serafima Radivilova (Slavic Languages), Wojciech Zalewski (Slavic Languages and Stanford Libraries), Victor Zoslashvsky (Russian and East European Studies)

Visiting Faculty: Andrew Arkhipov (Slavic Languages), Catherine W. Bracwell (History), Robert Debski (Slavic Languages), Miroslava Holubova (Slavic Languages), Anatoly Polikarpov (Slavic Languages), Mark Von Hagen (History), Andrey Zorin (Slavic Languages)

Affiliates: Dorothy Atkinson (AAASS), Coit Blacker (IIS), Robert Conquest (Hoover Institution), Joseph D. Dwyer (Hoover Institution), Gail Lapidus (Institute for International Studies)

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 an interdisciplinary A.M. degree program in Russian and East European Studies. The A.M. program, which may be taken either separately or coterminally with an A.B. degree program, is directed by the CREES steering committee, which is composed of faculty members affiliated with the center. The interdisciplinary A.M. program typically serves three types of students:

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

There is no established interdisciplinary undergraduate degree program in Russian and East European Studies at Stanford University. However, with appropriate faculty approval, an undergraduate may petition to set up an individualized program (see the "Individually Designed Majors" section of this bulletin.)

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 Graduate Degree Progress Section of the Registrar's Office. The annual deadline for all applications to the A.M. program 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 his or her proposed adviser in Russian and East European Studies in drafting this schedule. The application also should include: (a) a current Stanford transcript, (b) a one-page statement of purpose, and (c) two letters of recommendation from Stanford professors. Applicants must have an average letter grade indicator (LGI) of at least 'B' (3.0). Coterminal applicants must take the General Test of the Graduate Record Examination and have the results sent to Graduate Admissions, the Registrar's Office.

3. Complete 15 full-time quarters or the equivalent, or three quarters in full-time residence after completing 180 units; and complete, in addition 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 requirements is available from the center.

SLAVIC THEME HOUSE

Slavianskii Dom, at 650 Mayfield Avenue, is an undergraduate residence which houses 50 students and offers them a wide variety of opportunities 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 organization 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, the 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 program. 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 English are ordinarily expected to take the Test of English as a Foreign Language (TOEFL) and have the results sent to Graduate Admissions, the Registrar's Office.
4. All applicants must take the general test of the Graduate Record Examination and have the results sent to Graduate Admissions, the Registrar's Office.

The deadline for submission of applications for admission and for financial aid is January 1. Admission is normally granted for Autumn Quarter, but requests for exceptions are considered.

The successful applicant generally demonstrates the following strengths: adequate foreign language study, course work in Russian and East European studies in various disciplines, outstanding grades in previous academic work, high GRE scores (particularly verbal and analytical), strong letters of recommendation, and a persuasive statement 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 “Advanced 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 rather than specific courses, with the exception of the Core Seminar which all A.M. students are required to take. Each student, with the advice of the CREES academic coordinator, selects 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; these are in addition to the Core Seminar. All course work applied to the 40-unit minimum must deal primarily with Russian/Soviet/post-Soviet or East European studies.
3. Core Seminar: students must successfully complete the three-quarter Core Seminar (see below) in Russian and East European Studies.
4. All course work qualifying for the 40-unit minimum must have a letter grade indicator (LGI) of 'B' or higher.
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 should 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 SEMINAR

The core seminar is offered each academic quarter and is required of all A.M. students. Content and instructors vary quarter to quarter, taking advantage of the expertise of resident and visiting faculty. The focus is an interdisciplinary subject area of fundamental importance within modern Russian, Soviet, post-Soviet, and East European studies, and it addresses questions of research, methodology, and current scholarship (see below).

FINANCIAL AID

Subject to funding, CREES has a limited amount of financial aid to offer in the form of Foreign Language and Area Studies (FLAS) fellowships and College Work Study Graduate Stu-
dent Assistantships. 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.

Work Study awards, based on a combination of financial need and merit, are ordinarily made to CREES A.M. students.

For further information regarding financial aid, contact the Center for Russian and East European Studies (CREES), 200 Encina Hall, Stanford University, Stanford, CA 94305-6055; telephone 415-725-2563.

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 doctoral program in this field must apply to one of the departments offering a Ph.D. with an emphasis on the area of the former Soviet Union or Eastern Europe, such as Economics, History, Political Science, and Slavic Languages and Literatures.

COURSES

110A/210A, 110B/210B. Ukrainian Reading Course — (Same as Slavic Languages 110A/210A, 110B/210B.) Provides a knowledge of Ukrainian as a research tool. Prerequisite: knowledge of basic Ukrainian or a reading knowledge of Russian or Polish.

3 units, Aut, Win (Maslovskova-Lorentz)

176. Nationalism, Ethnicity, and Soviet Disintegration — Historical and comparative approach provides an overview of nationalism as one of the dominant forces in the world and its impact on Soviet disintegration. The causes of the failure of Soviet nationality policy and ethnic relations in the Soviet successor states.

3 units, Win (Zaslavsky)

200. Directed Individual Study — For students engaged in special interdisciplinary work that cannot be arranged by department.

1–5 units, Aut, Win, Spr (Staff) by arrangement

250, 251, 252. Core Seminar in Russian/Soviet and East European Studies — Required of all students in the A.M. program; open to qualified graduate students with the consent of the instructor.

250. Core Seminar: The Gorbachev–Yeltsin Years and After — Focuses on leadership policies and elite and mass responses within the core Russian republic from 1985 to the present. The Gorbachev–Yeltsin struggle, the 1989, 1990, and 1991 elections, the failed coup, the dissolution of the Soviet Union, and the current political struggles.

3 units, Aut (Dunlop) by arrangement

251. Core Seminar: Social Change and Social Structure in Russia — The emergence, functioning, and collapse of Soviet-type societies. The role of the Soviet state in creating a new social structure and the incomplete and contradictory nature of military-driven modernization that turned the Soviet system into a blend of industrial and traditional societies.

3 units, Win (Zaslavsky) by arrangement

252. Core Seminar: Politics and the Arts in the Era of the Russian Revolution, 1905-1935 — Using source materials, examines the foundations of Soviet cultural policy, emphasizing art and architecture. Themes: traditional Russian culture vs. the iconoclastic world of pre-Revolutionary Russian avant-garde artists; the experience of radical artists during the early Soviet period; the evolution of Party concerns about culture; the historical background, the aesthetics, ideology, and politics of Soviet Socialist Realism as an official cultural policy.

3 units, Spr (J. Kollmann) by arrangement

AFFILIATED DEPARTMENT OFFERINGS

The courses listed below by department deal primarily with Russia, the Soviet Union, or Eastern Europe. See respective department listings for course description. 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.
BUSINESS
   Aut (Miller) TF 3:20–5:05

ECONOMICS
120. Socialist Economies in Transition
   5 units, Spr (Litwack)
217. Money and Finance in Economic Development
   5 units, Spr (McKinnon)

HISTORY
24A. Russian Civilization from 9th to 17th Centuries
   5 units, Aut (J. Kollmann) MTWTh 10
125. 20th–Century Eastern Europe
   5 units, Aut (Naimark) MTWTh 11
217A,B/317A,B. Undergraduate/Graduate Colloquium: Empire and Nation in Russian and Soviet History
   8-10 units, Win, Spr (Von Hagen)
218/318. Undergraduate/Graduate Colloquium: Origins and Development of Balkan Nationalism
   5 units, Win (Bracewell) by arrangement
220. Undergraduate Colloquium: Yugoslavia in Dissolution
   5 units, Win (Vucinich) by arrangement
221. Undergraduate Colloquium: History and Myth in the Balkans
   5 units, Spr (Bracewell) by arrangement
225. Undergraduate Colloquium: East European Women and War in the 20th Century
   5 units, Win (Jolluck) W 1:15–3:05
   5 units, Aut (Kleiman) TTh 3:15–5:05
261/361. Nuclear Weapons—Theories and History—(Same as History 261/361.)
   5 units, Spr (Holloway, Bernstein)

LINGUISTICS
626A,B,C. Beginning Turkish
   3 units, Aut, Win, Spr (Ayanoglu)

POLITICAL SCIENCE
   5 units, Win (Blacker, Holloway)

138B. Seminar: Security and Diplomacy
   5 units, Spr (Lewis)
224H. Seminar: The Collapse of the Soviet Union—Causes and Consequences
   5 units, Spr (Holloway)
240. Seminar: Security in an Insecure World
   5 units, Aut (Blacker)
246. Colloquium: Nuclear Weapons—Theories and History—(Same as History 261/361.)
   5 units, Spr (Holloway, Bernstein)

SLAVIC LANGUAGES AND LITERATURES

GENERAL
130A/230A. Polish Cinema of Moral and Political Involvement
   3-4 units, Aut (Debski) by arrangement
145/245. The Age of Experiment (1820–1864)
   4 units, Aut (Greenleaf) MWF 11
146/246. Struggles with Authority in the Russian Novel, 1861–1922
   4 units, Win (Moeller–Sally) MWF 11
147/247. State and Revolution: Russian Literature in the 20th Century
   4 units, Spr (Freidin) MWF 10
151. Dostoevsky
   4 units, Aut (Frank) TTh 2:15–4:05
155/255. Transitions: Chekhov, the Modern Short Story, and Modern Drama
   4 units, Spr (Moeller–Sally) MW 2:15–4:05
157. Memory, Mind, and the Body in the Works of Milan Kundera
   4 units, Win (Moeller–Sally) MW 2:15–4:05
161/261. Poetess: The Grammar of the Self When the Poet is a Woman
   4 units, Spr (Greenleaf) TTh 11–12:30
190. Modernism and the Humanities: Tolstoy’s Anna Karenina and the Social Thought of Its Time—(Same as Humanities 197F.)
   5 units, Win (Freidin) MW 1:15–3:05

UNDERGRADUATE
1A. First-Year Russian A
   5-6 units, Aut (Schupbach, Radivilova) MTWThF 9, 10, or 11
2B. First-Year Russian B
   5-6 units, Win (Schupbach, Radivilova) MTWThF 9, 10, or 11
3C. First-Year Russian C
   5-6 units, Spr (Schupbach, Radivilova, Staff) MTWThF 9, 10, or 11
5A,B,C. Beginning Polish
   4 units, Aut, Win, Spr (Debski)
   by arrangement
6A, B, C. Intermediate Polish
4 units, Aut, Win, Spr (Debski) by arrangement

7A, B, C. Advanced Polish
4 units, Aut, Win, Spr (Debski) by arrangement

11A, B, C. Beginning Czech
4 units, Aut, Win, Spr (Holubova) by arrangement

12A, B, C. Intermediate Czech
4 units, Aut, Win, Spr (Holubova) by arrangement

50. Review of Russian Grammar: Repair Russian
3 units, Aut (Schupbach) by arrangement

51, 52, 53. Second-Year Russian
5 units, Aut, Win, Spr (Greenhill, Moeller-Sally, Mueller-Vollmer)
MWF 12 or 1:15, TTh 12

111, 112, 113. Third-Year Russian
3 units, Aut, Win, Spr (Schupbach, Greenleaf) MWF 1:15

114, 115, 116. Third-Year Russian Conversation and Composition
2 units, Aut, Win, Spr (Greenhill) TTh 1:15

119A/219A. Technical Translation
Win (Schupbach)

SLAVIC LANGUAGES AND LITERATURES

683

192. Russian Oral Tradition
4 units, Aut (Arkhipov) by arrangement

198. Comparison of Russian and English
4 units, Aut (Schupbach, Polikarpov) by arrangement

199. Individual Work
1–5 units, any quarter (Staff) by arrangement

200. Proseminar in Russian Literature
4 units, Aut (Moeller-Sally) M 3:15–5:05

200A. Introduction to Slavic Bibliography
1 or 3 units, Aut (Zalewski) W 3:15–5:05

207A. Advanced Polish — For graduate students.
4 units, Aut (Debski) by arrangement

214. Biblical Apocrypha and Pseudepigrapha
4 units, Spr (Arkhipov) by arrangement

220. Literary Translation
4 units, Spr (Schupbach) by arrangement

223A/223B. Graduate Seminar: Russian Literature and the Literary Milieu of the NEP Period: The Problem of Authorship (1921-1928)
4 units, Win, Spr (Freidin)

270B. Pushkin in the Romantic Context
4 units, Aut (Greenleaf) T 10–12

299. Individual Work
1–12 units, any quarter (Staff) by arrangement

399A, B, C. Advanced Research Seminar in Russian Literature
2–4 units, Aut, Win, Spr (Staff) by arrangement

Emeriti: (Professors) Joseph Frank, Jack A. Posin, Lawrence L. Stahlberger, Joseph A. Van Campen; (Assistant Professor) Elisabeth Stenbock-Fermor
Chair: Gregory Freidin
Professors: Lazar Fleishman (on leave), Gregory Freidin, Richard D. Schupbach
Assistant Professors: Monika Greenleaf, Stephen Moeller-Sally
Lecturers: Jasmina Bojic, Rima Greenhill, Lesya Maslovska-Lorentz, Patricia Mueller-Vollmer, Sima Radivilova, Wojciech Zalewski (Curator, Russian and East European Collection, Stanford Libraries)
Visiting Professor: Andrey Zorin
Visiting Associate Professor: Anatoly Polikarpov
Visiting Assistant Professors: Andrey Arkhipov, Robert Debski, Miroslava Holubova
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, 114, 115, 116, 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, 187, 187, 187, 187.

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 letter grade indicator (LGI) 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, 114, 115, 116, 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 24B, *120C. 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, 123A. 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 letter
grade indicator (LGI) of ‘C’ or better in order to receive credit toward the major.

* History 120C may be counted only once toward program requirements.

**HONORS PROGRAM**

Students in either concentration with an LGI 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 must take a course in literary or cultural theory. Students concentrating in Russian Language, Culture, and History and pursuing a project in cultural history are required to take a course in literary or cultural theory, or a graduate seminar in the area of their topic. Students concentrating in Russian Language and Literature who propose a senior project in Russian language 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 an LGI 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 newly opened 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.

**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 literature 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 fourth 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) suf-
Admission to Candidacy:

The examination should be passed at the end of the final quarter of required course work.

Masters 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 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 are outlined in the "School of Education" section of this bulletin. 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 expertise 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 West 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. 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 "Advanced Degrees" section of this bulletin. For specific departmental 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 theses 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 letter grade indicator (LGI) of 'B+' or better. Candidates specializing in literature 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 be 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 two 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 an LGI 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 an LGI 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; it consists of the candidate’s presentation of a research topic followed by a free discussion.

Following the department examination, 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 first 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 fourth 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 at least four quarters of teaching in partial fulfillment of the requirements of the Ph.D. degree.

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 ex-
amination 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

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, Department of Linguistics.

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 161, 163, 164
130A/230A. Polish Cinema of Moral and Political Involvement — Issues of morality and the fabric of life in a socialist state: two co-existing and intertwined themes in post WWII Polish cinema. Students examine the response made by Polish society to its irresolution, and the effect of these anxieties on moral attitudes and political choices. Nine films, deeply rooted in Polish history and social issues, provide the basis for analysis and discussion.
3-4 units, Aut (Debski) by arrangement

141. The Culture of Modern Russia: Between Empire and Nation-State, 18th and 19th Centuries
not given 1994-95

142. The Culture of Modern Russia: Between Empire and Nation-State, 20th Century
not given 1994-95

143/243. Early Russian Art and Architecture, 1050-1725—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 1994-95

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 1994-95

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, Gogol’s “poem-in-prose” Dead Souls); exploration 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 capitol (Pushkin’s “The Bronze Horseman” and “The Queen of Spades,” Gogol’s The Petersburg Tales, the young Dostoevsky’s The Double); Tolstoy’s memoir Childhood and Dostoevsky’s “notes” on the “inferno” of the Siberian labor-camps and his own consciousness. DR:7(2)
4 units, Aut (Greenleaf) MWF 11
146/246. Struggles with Authority in the Russian Novel, 1861-1922—Readings of Turgenev’s Fathers and Sons, Dostoevsky’s Crime and Punishment, Tolstoy’s Anna Karenina focus on the conflict between the individual and authority (social, moral, political) as a characteristic feature of the 19th-century Russian novel. Chekhov’s short fiction and Andrei Bely’s novel Petersburg as examples of the deformation and adaptation of this tradition at the end of the “age of Realism.” Literary, social, and political contexts. DR:7(2)

4 units, Win (Moeller-Sally) MWF 11

147/247. State and Revolution: Russian Literature in the 20th Century—Major works of Russian fiction and selected poetry, including the emigre and samizdat writings, in their literary and historical context (Babel, Bely, Blok, Brodsky, Grossman, Kataev, Mayakovsky, Nabokov, Olesha, Pasternak, Sholokhov, Siniavsky, Solzhentsyn, Zoshchenko, etc.). The way poets and novelists have constituted the post-revolutionary “historical experience” of the Russians. DR:7(2)

4 units, Win (Moeller-Sally) MW 2:15-4:05

151. Dostoevsky—Open to graduate students, seniors, and juniors. Major works in English translation with reference to related developments in Russian and European culture and intellectual history. Lectures and discussion section. DR:7(2)

4 units, Aut (Frank) TTh 2:15-4:05

153/253. Self and History in Tolstoy’s War and Peace—The writer’s work and thought in the context of Russian and European culture and intellectual history. Readings: War and Peace, A Confession, and selected short fiction.

4 units, not given 1994-95

155/255. 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, Spr (Moeller-Sally) MW 2:15-4:05

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 control. Readings: “Spring in Fialta,” The Gift, Camera Obscura, Invitation to a Beheading, Lolita, Pale Fire, Pnin, excerpts from Commentry to Pushkin’s Eugene Onegin, and Speak Memory: An Autobiography Revisited, background readings in

V. Alexandrov’s Nabokov’s Otherworld, Brian Boyd’s biography, and John Burt Foster’s European Modernism and Nabokov’s Art of Memory.

4 units (Greenleaf) not given 1994-95


4 units, Win (Moeller-Sally) MW 2:15-4:05

161/261. Poetess: The Grammar of the Self When the Poet Is a Woman—Examines individual strategies of “entry” into the lyrical (intimate-turned-public) “space,” distribution of roles and modes of address, legacy of tropes, and poetic lexicon shaped by a national male tradition. How does the female poet switch from object to 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.

4 units, Spr (Greenleaf) TTh 11-12:30

163. The Jewish Voice in Central and East European Literature

not given 1994-95

164. Revolutionary Medium: Russian Film and Literature in Interaction

not given 1994-95

190. Modernism and the Humanities: Tolstoy’s Anna Karenina and the Social Thought of Its Time—(Same as Humanities 197F.) Focusing on Tolstoy’s novel Anna Karenina, seminar explores the phenomenon of the emerging modernity of the late 19th century (reason and the irrational, authority and legitimacy, the institution of the family and the question of gender; individualism and estate society; capital and the city; autonomy of art, etc.) The novel and its historical and cultural context. The confrontation between two hypothetical cultural systems (“modernity” and “tradition”) with their own assumptions and codes. Conceptual framework is provided by pragmatic studies of society produced in Tolstoy’s lifetime (James and John Stuart Mills, Nietzsche, Marx, Weber, Durkheim)
and recent cultural semiotics of Clifford Geertz. To what extent does Tolstoy’s novel and contemporary social thought mutually illuminate?

5 units, Win (Freidin) MW 1:15–3:05

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.

1A. First-Year Russian A — Three-quarter sequence. Optional unit for extra work on pronunciation and grammar, by arrangement.
   5-6 units, Aut (Schupbach, Radivilova, Staff) MTWThF 9, 10, or 11

2B. First-Year Russian B — Three-quarter sequence. Continuation of 1. Optional unit for extra work on pronunciation and conversation.
   5-6 units, Win (Schupbach, Radivilova, Staff) MTWThF 9, 10, or 11

3C. First-Year Russian C — Three-quarter sequence. Continuation of 2. Optional unit for extra work on pronunciation and reading.
   5-6 units, Spr (Schupbach, Radivilova, Staff) MTWThF 9, 10, or 11

5A. Beginning Polish
   4 units, Aut (Debski) by arrangement

5B. Beginning Polish — Continuation of 5A.
   4 units, Win (Debski) by arrangement

5C. Beginning Polish — Continuation of 5B.
   4 units, Spr (Debski) by arrangement

6A. Intermediate Polish
   4 units, Aut (Debski) by arrangement

6B. Intermediate Polish — Continuation of 6A.
   4 units, Win (Debski) by arrangement

6C. Intermediate Polish — Continuation of 6B.
   4 units, Spr (Debski) by arrangement

7A. Advanced Polish
   4 units, Aut (Debski) by arrangement

7B. Advanced Polish — Continuation of 7A.
   4 units, Win (Debski) by arrangement

7C. Advanced Polish — Continuation of 7B.
   4 units, Spr (Debski) by arrangement

8A. Beginning Serbo–Croatian
   not given 1994-95

8B. Beginning Serbo–Croatian
   not given 1994-95

8C. Beginning Serbo–Croatian
   not given 1994-95

11A. Beginning Czech
   4 units, Aut (Holubova) by arrangement

11B. Beginning Czech
   4 units, Win (Holubova) by arrangement

11C. Beginning Czech
   4 units, Spr (Holubova) by arrangement

12A. Intermediate Czech
   4 units, Aut (Holubova) by arrangement

12B. Intermediate Czech
   4 units, Win (Holubova) by arrangement

12C. Intermediate Czech
   4 units, Spr (Holubova) by arrangement

50. Review of Russian Grammar: Repair Russian — Accelerated, remedial Russian for students with sufficient background to place, with the help of this course, into 52. Prerequisite: consent of instructor.
   3 units, Aut (Schupbach) by arrangement

51,52,53. Second-Year Russian — Three-quarter sequence consisting of intensive review and expansion of grammar and vocabulary and development of written and oral proficiency. Prerequisite: 1A, 2B, 3C, or equivalent.
   5 units, Aut, Win, Spr (Mueller-Vollmer, Greenhill, Moeller-Sally) MWF 12 or 1:15 TTh 12

110A/210A, 110B/210B. Ukrainian Reading Course — Provides a knowledge of Ukrainian as a research tool. Prerequisite: knowledge of basic Ukrainian or a reading knowledge of Russian or Polish.
   3 units, Aut, Win (Maslovska-Lorentz) by arrangement

   3 units, Aut, Win, Spr (Schupbach, Greenleaf) MWF 1:15

   2 units, Aut, Win, Spr (Greenhill) TTh 1:15

119/219. Advanced Russian for Social Scientists — Develops reliable reading skills in the technical language, underscoring systematic differences between this level, spoken Russian, and the language of literature. Questions of terminology, the use of participles, and other parts of speech, and use of the cases, prepositions, derivational innovations, et al. Extensive practice is provided.
   1 unit, not given 1994-95
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119A/219A. Technical Translation
1 unit, Win (Schupbach) by arrangement

120/205A. Advanced Russian for Students of the Physical Sciences, Mathematics, and Engineering—Develops reliable reading skills in Russian technical language, emphasizing mathematics and the physical sciences.
1 unit, not given 1994-95

ADVANCED UNDERGRADUATE AND GRADUATE LANGUAGE AND LITERATURE

167,168. Fourth-Year Russian Seminars I—II—Perfests verbal and written skills while concentrating on major problems in Russian cultural history as reflected in its literature. Texts approached systematically as "literature" and "documents" in the social and intellectual history of Russia. Conducted in Russian and open to all.

4 units, not given 1994-95

168. Fourth-Year Russian Seminars II—Tolstoy's Anna Karenina in literary, historical, and political context. Relevant contemporary texts in a variety of genres.
4 units, not given 1994-95

177/201. Advanced Russian—Reading, conversation, and composition. Prerequisites: 111, 112, 113, 114, 115, 116, or consent of instructor.
3 units, Aut (Greenhill) TTh 3:15-4:30

3 units, Win (Greenhill) TTh 3:15-4:30

3 units, Spr (Greenhill) TTh 3:15-4:30

181/204. Fifth-Year Russian—Open to graduate and undergraduate students with high fluency in Russian. Focuses on the issues of contemporary Russian life and culture and uses them as a vehicle for bringing speaking, writing, and comprehension abilities up to superior proficiency levels, emphasizing productive skills, i.e., speaking and writing. Structured around topics in history, sociology, demography, education, cross-cultural understanding, morals, and domestic and international politics. Instruction is based on active communicative interaction among students and creative language practice, imaginative tasks, and role playing derived from: radio and TV broadcasts, films, newspaper articles, samples of contemporary Russian prose, interviews with native speakers. Attention to linguistic accuracy, idiomatic and culturally specific words and concepts. Readings of brief literary and expository writings. In Russian
3 units, Aut (Radivilova) by arrangement

182/205. Fifth-Year Russian—Continuation of 181/204.
3 units, Win (Radivilova) by arrangement

183/206. Fifth-Year Russian—Continuation of 182/205.
3 units, Spr (Radivilova) by arrangement

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 (Arkhipov) not given 1994-95.

187. Russian Poetry of the 18th and 19th Centuries—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, Solov'ev. Lectures/discussions in Russian.
4 units, Aut (Arkhipov) MWF 12

188. Russian Poetry of the 20th Century—Required of all majors in Russian literature. A continuation of 187. Survey of main developments in Russian poetry in this century, focusing on Symbolism and post-Symbolist movements (Acmeism, Futurism, Constructivism, OBERIU). Close analysis of representative lyric poems of major modern poets (Bal'mont, Blok, Khlebnikov, Maikovskii, Tsvetaeva, Pasternak, Sel’vinskii, Kharmas, and others). Prerequisite: 187 or consent of instructor.
4 units, Spr (Zorin) by arrangement

189/289. Literature of Old Rus' and Medieval Russia—From the earliest times through the 17th century. Lectures concentrate on development of literary and historical genres and on links between literature and art, architecture, and religious culture. Readings in English. Graduate students read in original.
4 units, Win (Arkhipov) by arrangement

191. Grammatical Categories of Russian—Case, gender, number in the noun and aspect, tense, voice, mood, prefixation and transitivity in the verb are analyzed in detail. Comparisons drawn between Russian and English systems.
3 units, not given 1994-95

192. Russian Oral Tradition
4 units, Aut (Arkhipov) by arrangement
193. The Orthodox World — Introductory survey of 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.

3 units, not given 1994-95


3 units, not given 1994-95

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 should have at least two years of college Russian or the equivalent. Students not possessing a solid control of Russian morphology must take remedial work.

3 units, not given 1994-95

197. Advanced Topics in Russian Grammar III

3 units, not given 1994-95

198. Comparison of Russian and English — Overview of the Russian language, its history, grammar, and literature, with reference to similarities and differences in English.

4 units, Aut (Moeller-Sally) M 3:15-5:05

198A. Yugoslav Cinematography — Dialogue Tutorial — Open to sophomores only, with the instructor’s consent. Understanding European cinematography, focusing on Yugoslav film. Discussion of 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, Aut (Bojic) by arrangement

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) by arrangement

200. Proseminar in Russian Literature — Required of all entering graduate students. May be taken to satisfy the undergraduate honors requirement for literary and cultural theory. Literary scholarship as a profession. Topics: rhetoric, poetics, aesthetic theory, narrative, psychoanalysis, history, and sociology of literature, reception.

4 units, Aut (Moeller-Sally) M 3:15-5:05

200A. Introduction to Slavic Bibliography — Open to undergraduate and graduate students. Introduces students to library’s bibliographic and book reference sources, reference sources in English and Western languages, and provides a historical and critical analysis of Slavic bibliographic and reference tools and search methodology. Final bibliography project required. Knowledge of a Slavic language is required for students registered for 3 units; others register for 1 unit.

1 or 3 units, Aut (Zalewski) W 3:15-5:05

206A. Colloquium on Russian Language Teaching Methodology — Required of all first-time teaching assistants. Practical forum for the discussion of teaching methods and strategies in the Russian language classroom.

1-2 units, Aut (Radivilova) by arrangement

206B. Colloquium on Russian Language Teaching Methodology — Continuation of 206A.

1-2 units, Win (Radivilova) by arrangement

206C. Colloquium on Russian Language Teaching Methodology — Continuation of 206B.

1-2 units, Spr (Radivilova) by arrangement

207A. Advanced Polish — For graduate students.

4 units, Aut (Debski) by arrangement

207B. Colloquium on Russian Language Teaching Methodology — Continuation of 206B.

1-2 units, Spr (Radivilova) by arrangement

208. Reading Real Polish — Open to intermediate students of Polish and advanced learners of other Slavic languages. Techniques of approximative reading, skimming, scanning, searching for coherence, and text–puzzle are used with specially designed texts, gradually replaced by authentic texts of different types. The usefulness and effectiveness of a proposed technique of computer-assisted approximative translation is tested.

4 units, not given 1994-95

211. Introduction to Old Church Slavic

3 units, not given 1994-95

212. Old Russian and Old Church Slavic

4 units, not given 1994-95

213. History of the Russian Literary Language — Major structural and semantic changes from the 10th to the 19th centuries. Prerequisites: 211, 212.

4 units, not given 1994-95

214. Biblical Apocrypha and Pseudepigrapha

4 units, Spr (Arkhipov) by arrangement


4 units, Spr (Schupbach) by arrangement
221. Studies in Russian Fiction: The Age of Realism — Development of realism over the first two-thirds of the 19th century with attention to problems of structure and social and philosophical contexts, Russian and European.
4 units, not given 1994-95

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 1994-95

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) which deal with the problem of authorship, examined in the contemporary literary and socio-historical context. Emphasis on non-Party authors. Babel, Eikhenbaum, Mandelstam, Olesha, Tynianov, Zamiatin, and Zoshchenko.
223A. 4 units, Win (Freidin)
223B. Continuation of 223A.
4 units, Spr (Freidin)

224. Reading in the Russian Novel — Open to graduate and advanced undergraduate students. Intensive study of Brothers Karamazov and its relation to contemporary European and Russian philosophical, literary, and social contexts. Readings in Russian.
4 units, not given 1994-95

225A. Bulgakov — Close analysis of Mikhail Bulgakov’s major prose works.
3 units, not given 1994-95

225B. Pushkin — Close reading of Pushkin’s major poems and prose accompanied by detailed examination of his cultural milieu. Emphasis on essential changes in the understanding of literary concepts relevant to this period of Russian literature (poetic genres, the opposition between poetry and prose, Romanticism, etc.)
3 units, not given 1994-95

4 units, not given 1994-95

227. Boris Pasternak and the Poetry of the Russian Avant Garde — Pasternak’s work examined within a broad cultural context to identify and analyze characteristic features of the Russian avant garde poetics.
4 units, not given 1994-95

228. Boris Pasternak’s Safe Conduct (1929-1931) — Close analysis of the text. Theoretical and historical problems of the study in the autobiographical genre.
4-5 units, not given 1994-95

229. Russian Versification — History and theory of Russian versification from the 17th to the 20th century.
4 units, not given 1994-95

230A. Russian Formalism and Structuralism — The Russian Formalists’ contribution to literary criticism and theory; relationship of Russian Formalism to critical movements in the West; the Prague School, and the Soviet Structuralists. Knowledge of Russian not required.
4 units, not given 1994-95

230B. Russian Formalism and Structuralism in their Historical Background — Consideration of formalist and structuralist ideas in context of 19th- and 20th-century critical movements.
4 units, not given 1994-95

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. No knowledge of Russian is required.
4 units, not given 1994-95

4 units, not given 1994-95

270. Pushkin — Close reading of Pushkin’s major poems and prose accompanied by detailed examination of his cultural milieu. Emphasis on essential changes in the understanding of literary concepts relevant to this period of Russian literature (poetic genres, the opposition between poetry and prose, Romanticism, etc.)
4 units, not given 1994-95

270A. Pushkin’s Eugene Onegin
2 units, not given 1994-95

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 re-fashion autopoetraits 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, Aut (Greenleaf) T10-12

271. Solzhenitsyn — Solzhenitsyn in the novel, short story, drama, and essay forms, and in the genre most characteristic of him: “literary investigation.” Knowledge of Russian not required, but concentrators in Slavic are expected to do a major portion of the reading in Russian.

4 units, not given 1994-95

272. Mandelstam and the Modernist Paradigm — Examination of 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 1994-95

277. Gogol — Open to advanced undergraduates with instructor’s consent. Examination of Gogol’s enigmatic artistic career, focusing on issues such as history, authorship, aesthetics, and society. Gogol’s fictional, dramatic, and non-fictional works from a variety of theoretical and contextual perspectives. Readings in Russian.

4 units (Moeller-Sally) not given 1994-95

278. Tolstoy — Open to exempt undergraduates with instructor’s consent. Tolstoy’s creative evolution from his early and late short fiction (*Childhood, The Sevastopol Tales, and The Kreutzer Sonata*, etc.) and non-fiction, (*Confession and Anna Karenina*), together with the appropriate critical texts. Readings in Russian.

4 units, not given 1994-95

279. Dostoevsky — The writer’s shorter works in the context of European thought and literature.

4 units, not given 1994-95

287E. F. T. Marinetti and Futurism(s) — (Enroll in Comparative Literature 251E, French and Italian 251E.)

5 units, Spr (Schnapp)

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) by arrangement

300. Graduate Seminar: Theory of Narrative

4–5 units, not given 1994-95

300A. Graduate Seminar: Russian Literature as Institutions — Investigation of the institutions of Russian literature in selected periods, focusing on theoretical and practical issues: ideology, value, production and dissemination, authorship, and reading publics. Students without reading knowledge of Russian may take course only with the consent of instructor.

4 units, not given 1994-95

300B. Graduate Seminar: Utopianism in Russian Literature

4 units, not given 1994-95

300C. Introduction to Archival Research in Russian Literature and History

3 units, not given 1994-95

300D. Graduate Seminar: The Voices of History — Analysis of the web of interrelationships linking belles-lettres and historical genres in Russian culture of the 1820s, ‘30s, and ‘40s. The role that discussions of history had in the formation of a uniquely Russian cultural world view. Problems of genre and literary form in Gogol, Karamzin, and Pushkin.

4 units, not given 1994-95

300E. Graduate Seminar: Russian Theater — 1898–1930 — Open to qualified undergraduates with instructor’s consent. The golden age of Russian theater from foundation of the Moscow Art Theater through OBERIUTY. Theater as seen through theoretical writings (Stanislavsky, V. Ivanov, Meyerhold, Tairov) and performances (Balaganchik, Petrushka, Pobeda nad solntsem, Klop).

4 units, not given 1994-95

300F. Graduate Seminar: Literature of Russian Emigration — Relationship between the emigre and metropolitan parts of Russian culture after the 1917 revolution. Distinctive features of Russian diaspora literature. Its main centers (Paris, Kharbin, Prague), tendencies (the Paris School, et al), and authors (Tsvetaeva, Khodasevich, Poplavsky, Bunin, Remizov, Nabokov).

4 units, not given 1994-95

300G. Mayakovsky, The Poet of Revolution — Close reading of the major works of the poet.

4 units, not given 1994-95

300H. Graduate Seminar: Russian Futurism — Open to qualified undergraduates with instructor’s consent. The idea of synthesis of arts: manifestos, fine arts, theater and cabaret, books, film. Futurism and Russian avant-garde, 1920–23.

4 units, not given 1994-95
300J. The Tradition of the Classics in the Russian Poetry of the Early 20th Century
4 units, not given 1994-95

369. Philosophies of Form — (Enroll in French and Italian 295E, Comparative Literature 369.)
5 units, Aut (Gumbrecht, Schnapp)
T 3:15-6:05

375. Dostoevsky and French Literature — Dostoevsky’s relations with French literature as a source of inspiration for his own work and his inspiration of modern French writers. Notes from the Underground and Crime and Punishment are read with works by Balzac, Camus, Diderot, Gide, and Sartre.
5 units, not given 1994-95

399A,B,C. Advanced Research Seminar in Russian Literature — Offered as follow-up to 200- or 300-series seminars, as needed.
2-4 units, Aut, Win, Spr (Staff) by arrangement

SOCIOLOGY

Emeriti: (Professors) Bernard P. Cohen, Alex Inkeles, Dudley Kirk, Seymour M. Lipset
Chair: Cecilia Ridgeway
Associate Professors: David B. Grusky, Susan Olzak
Assistant Professors: Jerald R. Herting, Leonard Hochberg, Szonja Szelenyi (on leave Autumn)
Courtesy Professors: JoAnne Martin, Francisco O. Ramirez
Courtesy Associate Professors: Larry Diamond, Arnold Eisen, Clifford J. Nass
 Courtesy Assistant Professor: Joel Podolny
 Lecturers: Susan F. Chow, Lynn Eden
 Consulting Professor: George Bohrnstedt
 Consulting Associate Professors: Ruth Cronkite, Janet Johnston

Sociology is concerned with the full spectrum of social behavior (of individuals, small groups, large organizations, communities, institutions, and societies) and provides a strong intellectual background for students considering careers in the professions and in 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.

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.

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 letter grade indicator (LGI) of ‘C-’ or better (except for Sociology 190–194). Related course work from other departments may fulfill part of this requirement, but such work must be approved in advance by a departmental adviser and must not exceed 15 units. All degree candidates must fulfill the following core requirements:

1. 194, Departmental Seminar for Undergraduate Majors, offered each Autumn Quarter. It is recommended that students take it early in their program. It is also suggested for students who are considering a major in Sociology.
3. An introductory course in statistics, such as Statistics 60 or Psychology 60 or equivalent.
4. 170, Classics of Modern Social Theory, or an equivalent course in social theory.
5. At least three foundation courses, each from a different area of concentration.
To complete the general sociology major, the student must complete 26 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 curriculum, and (2) complete 20 units of course work in the selected area of concentration.

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 which 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 which shape the structure of organizations and the social psychological and interpersonal process which shapes the behavior of individuals within organizations. Careers which relate 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 which relate 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: 128, 129, 132, 150, 155, 157, 220–227, 229, 257, 320

2. Organization Studies
   Foundation Course: 160
   Other Courses: 110, 128, 130, 163–169, 260–269, 360–369

3. Social Stratification and Inequality
   Foundation Course: 140
HONORS PROGRAM

Students desiring to undertake an intensive, individualized program of study are encouraged to apply for admission to the department’s honors program. Students must be accepted no later than the beginning of the Spring Quarter of their junior year. Admission to the program requires an average LGI of ‘B+’ or better in courses taken within the major, and an overall LGI of ‘B’ or better. Students in the honors program work on an individualized research or scholarly project under the direction of a faculty adviser. In some cases, student projects are independently designed.

Students interested in the honors program should meet with their undergraduate adviser. Before being admitted to the program, students must have the permission and support of a faculty member who will serve as principal adviser for the honors project.

Honors students may earn up to 15 units credit for work leading to completion of the required honors thesis. To be eligible for an honors degree, an LGI of ‘A−’ or better must be earned on the honors thesis. If an ‘A−’ is not earned, the thesis credit counts toward the standard major requirements.

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 an average LGI 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 100 level; at least 18 course units should 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 381. An LGI 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. 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 letter grade indicator (LGI) of ‘B−’ or better. All course work must be at level 100 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. Interested 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, Department of Sociology faculty review the academic progress of each student. 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.
2. Complete a teaching apprenticeship for three quarters under the supervision of a faculty member.
3. Complete four required graduate foundation courses, one in each of four areas of specialization: Political and Comparative/Historical Sociology (310), Social Psychology (320), Stratification (340), and Organization Studies (360). These broad courses provide an analytic and rigorous introduction to each area. At least three foundation courses must be completed in the first year of graduate study, and the fourth 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 381 in the first quarter after entering the department. In the next three quarters, methodology courses (Sociology 382, 383, 384) are required of all students. After completing the foundation and methodology courses, students must take a required course in Research 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. An exam committee drawn from departmental faculty evaluates the paper.
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:
   - 310. Political and Comparative/Historical Sociology
   - 320. Foundations of Social Psychology
   - 340. Social Stratification
   - 360. Foundations of Organizational Sociology
2. Research Methods:
   - 381A. Design and Analysis
   - 381B. Social Scientific Computing
   - 382. The General Linear Model
   - 383. Advanced Models for Discrete Outcomes
   - 384. Advanced Models for Continuous Outcomes
3. Theory, Analysis, and Research Design:
   - 372. 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 an LGI of 'B-' or better. 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 to 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.

OPEN TO ALL STUDENTS

INTRODUCTORY

1A. Introduction to Sociology — How people develop in a changing social environment. Emphasis is on the interaction between individuals and the groups to which they belong. Topics: internalizing society's norms, developing a self-image in relation to others, and problems of fit between the individual and the organizations and institutions of the society. Abstract theories enhance an understanding of the social world. Some classical theorists; examples of contemporary social research. DR:9(5)

5 units, Aut (Dornbusch) MWF 11

1B,C. Introduction to Sociology — Introduction to concepts and theories that inform sociological inquiry. Emphasis is on how social processes and structures limit or facilitate the realization of individual goals in contemporary American society. Possible topics: distribution of power and status in small groups; family processes; ethnicity, race, and gender; religious belief and organization; American culture and exceptionalism; social inequality and mobility; social and economic organizations; America and the global system. DR:9(5)

5 units, Win (Benavot, Shenav) MWF 9

Spr (Szelenyi) TTh 1:15-2:45

5. Status, Friendship, and Social Pressure: An Experiential Approach — The basic social processes that structure the individual's experience in interpersonal situations, including group pressure on individual choices, social control of deviants, operation of status distinctions (sex and race), formation of friendships, and formation of intimate (love) relationships. Structured exercises and simulation gaming in section meetings provide experience with these processes. Lectures examine the processes in terms of theoretical ideas, empirical research, and clinical strategy. DR:9(4 or 5)

5 units, Win (Berger)

MWF 10 plus one two-hour section
M or T 2:15-4:05 or T 7-8:50 p.m.

108. Peace Studies— (Same as Education 173X, History 154, Political Science 133, Psychology 142.) 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. Lectures on how our world is changing; the nature of peace and peaceful processes; peace at the operational level (the cause of war, building negative peace, building positive peace); peace—moral and normative considerations; peace and you.

5 units, Spr (Bernstein, Bland, Dreikmeier, Holloway, Moses, Noddings, Ross)

PETERS SEMINARS FOR SOPHOMORES

50. Teams and Teamwork — The growing knowledge base dealing with work teams solving nonroutine problems. Conceptual tools for observing and understanding teams. Understanding what is necessary for successful teamwork, examining how a sociological approach can aid the design and operation of teams, and developing critical skills for evaluating claims and criticisms of teams as problem solving units.

5 units, Win (Cohen)

51. Social Demography and Health — The social demography of health and mortality in the U.S. Emphasis is on the historic and demographic roots of the U.S. mortality transition and the current social and demographic implications of trends in health behavior. Health as an aspect of social stratification systems and information and perspectives on current public health debates.

4 units, Spr (Herting)

POLITICAL AND COMPARATIVE/HISTORICAL SOCIOLOGY

110. Politics and Society— (Graduate students register for 210.) Main themes of political sociology, origins and expansion of the modern state, linkages between state and society, 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. DR:9(5)

5 units, Aut (Meyer) TTh 1:15-3:05

111. Introduction to Historical Sociology— (Graduate students register for 211.) Analysis of the relationship between historical events and sociological structures. A variety of theoretical perspec-
Prerequisite: 1.

108. Sociology of Mental Health — (Graduate students register for 257; same as Human Biology 157.) Interdisciplinary introduction to the concept of mental health, its causes and treatment. Emphasis is on understanding the individual's health status, mental illness, and the social and environmental factors that influence it. DR: 9(5)

112. Social Foundations of Democracy — (Graduate students register for 212; same as Political Science 116L.) Social, cultural, political, economic, and international factors favorable to the development and consolidation of democracy in historical and comparative perspective. Worldwide development and re-emergence of democracy in the past decade. Case studies of individual national experiences with democracy.

5 units, Spr (Diamond) MWF 11

117. Sociology of Revolution — Comparative study of revolutions, their causes, processes, and consequences. Emphasis is on the classic, "Atlantic" revolutions of the 17th and 18th centuries (the English, American, and French cases). Topics: the role of ideology and violence; conflict among classes, parties, and status groups; the relationship of socio-geographic structures to stages of revolutionary processes; and the formation of new political regimes and societies. Weaves together empirical issues and theoretical perspectives.

3 or 5 units, Spr (Hochberg) MW 9–10:30

130. Education and Society — (Graduate students register for 230; same as Education 220C.) 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.

5 units, Spr (Meyer) TTh 10–11:50

133. Communication, Technology, and Society — (Graduate students register for 233; same as Communication 169, Science, Technology, and Society 162.) Methods for analyzing and addressing the question: Does technology drive societal change or does society drive technological change? Three case studies: computers and the self, media and community, and the information economy. DR: 9(5)

4 units, Spr (Nass) TTh 10–11:50

136. Law and Society — Introduction to the relationship between law and society. Competing theoretical approaches. Topics: litigation, crime, civil rights, law and organizations, comparative law and lawyers. Students are encouraged to think of how organizations and individuals incorporate information from the legal environment into everyday practices, and of law as more than litigation and lawyers. Prerequisite: 1

5 units, Aut (Staff) MWF 10
132. Gender and Education — (Same as Education 170, Feminist Studies 130.) Examines 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) MW 3:15-5:05

134. Education and the Status of Women: Comparative Perspective — (Same as Education 197, Feminist Studies 139A.) 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. DR:9(5)
4-5 units, Win (Ramirez) MWF 11-12:30

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 poverty; class differences in consciousness, values, and lifestyles. DR:9(5)
5 units, Spr (Szelényi) TTh 9-10:30

142. Sociology of Gender — (Same as Feminist Studies 134.) 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. Social consequences of gender inequality, e.g., the feminization of poverty and problems of interpersonal relations. DR:9(5)
3-5 units, Win (Ridgeway) TTh 12:30-2:05

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 (Szelényi) given 1995-96

145. Race and Ethnic Relations — Race and ethnic relations in the U.S. and other settings. Topics: causes and consequences of race and ethnic inequalities in attainment, affirmative action policies and their consequences, sources of ethnic/racial conflict, and the dynamics of ethnic protest movements. DR:9(5)
5 units, Aut (Olzak) TTh 10 section by arrangement

147. Women of Color: The Intersection of Race, Ethnicity, Class, and Gender — Focuses on the changing status and consciousness of women of color in the U.S. The experiences of Latinas, Asian-Americans, and Afro-Americans. International developments among Third World women are introduced in discussions of emerging transnational patterns. Changing social, economic, and political status of women of color and changes in cultural ideologies and self-perceptions.
5 units, Spr (Chow) TTh 11 W 7 p.m.

149. The Urban Underclass — (Graduate students register for 249.) Analysis of 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.
5 units, Spr (Olzak) TTh 11 section by arrangement

150. The Family — Family composition, organization, and processes. Historical and recent trends in Western societies examined and compared with current situations in developing countries. Topics: marriage and divorce, fertility, illegitimacy, value of children, family size, household composition, and sex roles.
5 units, Spr (Herting) MW 2:15

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 adequacy of current indicators of assimilation. In class interviews of Asian-Americans from local communities.
5 units, Win (Chow) TTh 11 W 7 p.m.

153. Population Perspectives in the Third World — (Same as Economics 133, Food Research 136, Human Biology 136; graduate students register for Food Research 236.) Topics: population
growth in the Third World; demographic terminology and methods; trends and determinants of fertility, mortality, and migration; population growth in relation to the environment, urbanization, and development; theories of demographic change; population policies; prospects for the future.

5 units, Spr (Wilson) MW 9-10:50

FORMAL ORGANIZATIONS

5 units, Aut (Creighton) MWF 9
section by arrangement

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 (Aut) Hannan MW 3:15-5:05

163. Organizational Decision Making — (Same as Business 371, Political Science 107.) Decision making in complex organizations: universities, schools, hospitals, business firms, and public bureaucracies. Information, power, resources, organizational structure, and the environment. Alternate models of choice and their implications.
5 units (March) given 1995-96

165. Organizational Leadership — (Same as Business 379, Political Science 108.) Problems of leadership in complex organizations: universities, schools, hospitals, business firms, armies, and public bureaucracies. The role of major executives.
5 units, Aut (March)

166. Organizations and Public Policy — (Graduate students register for 264; 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. The several roles of organizations in relation to public policy: organizations as decision makers and problem solvers, as change agents, and as clients. Prerequisite: 160 or Industrial Engineering 100.
5 units, Win (Scott) MWF 9
section by arrangement

168. Seminar: War, Peace, and Organization Theory — (Same as Political Science 143L.) Draws on concepts from organization theory to build understanding of military institutions (including technological and doctrinal innovation), the causes of war, and the nature of the organizational change. Classic texts in organizational analysis (Simon, March, Cyert) and well-established works in security studies (Allison, Steinbruner, Posen). Focuses on recent organizational approaches (e.g., new institutionalism, cultural approaches) and recently published or forthcoming work on security issues.
5 units, Spr (Eden) TTh 1:15-3:05

SOCIOLOGICAL THEORY

170. Classics of Modern Social Theory — The work of classical sociological theorists Karl Marx, Max Weber, and Emile Durkheim. Their contributions to the discipline through their ideas on: the transition from feudalism to capitalism, problems of modern social organization, and the nature of the emergent social relation. Material from George Lukacs, Robert K. Merton, and Talcott Parsons places these theories in a contemporary perspective. DR:8(3) or 9(5)
5 units, Win (Szelényi) TTh 9-10:30

RESEARCH METHODS

180. Methods for Sociological Research — (Graduate students register for 380.) Introduces the methods used in contemporary sociological research, focusing on strategies for designing research and analyzing data.
5 units, Win (Benavot, Shenhav) MWF 1:15

181. Introduction to Statistical Methods for Sociologists — Elements of statistical description and inference, emphasizing the statistical methods of principal relevance to sociology. Discussion of contingency tables, and elementary correlation and regression. A special section develops computer skills.
5 units, given 1995–96

INDIVIDUALIZED LEARNING EXPERIENCES, PRIMARILY FOR UNDERGRADUATE MAJORS

190. Undergraduate Individual Study 1-5 units (Staff) by arrangement

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) by arrangement

192. Undergraduate Research Apprenticeship — Work in an apprentice-like relationship with specific faculty member(s) in an on-going research project. Prior arrangement required.
1-10 units (Staff) by arrangement
193. Undergraduate Teaching Apprenticeship
1-5 units (Staff) by arrangement

194. Departmental Seminar for Undergraduate Majors — Required of all sociology majors. Introduces sociology as an academic discipline, career opportunities in the field, and current faculty research interests.
2 units, Aut (Scott) W 12

195. Honors Seminar — Required of all students planning an honors thesis. Write and present portions of a thesis (e.g., prospectus and a research proposal) to fellow honors students who may assist you in beginning your project. Workshop format helps conceptualize, develop, and review thesis as it progresses. Organized to encourage the early development of a thesis and to enable the student to compete for awards from the Fund for Undergraduate Research.
2 units (Staff) by arrangement

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.
15 units (Staff) by arrangement

FOR ADVANCED UNDERGRADUATES AND GRADUATE STUDENTS

POLITICAL AND COMPARATIVE/HISTORICAL SOCIOLOGY

210. Politics and Society — For graduate students; see 110.
5 units, Aut (Meyer) TTh 1:15-3:05

211. Introduction to Historical Sociology — For graduate students; see 111.
3 or 5 units, Aut (Hochberg) MW 10-11:30

212. Social Foundations of Democracy — For graduate students; see 112.
5 units, Spr (Diamond) MWF 11

213. Political and Economic Organization of the World System — Seminar on current theory and research on the structures of the world polity, economy, and culture as they affect the organization and development of national societies. Dependency theories, world-economy theories, and world effects on the evolution, dominance, and modern forms of states and regimes. Prerequisite: previous work in comparative or political sociology.
5 units (Meyer) given 1995-96

217. Seminar: Spatial Systems and Social Processes — The differentiation of social processes through spatial systems in agrarian and commercial societies, the contingencies of human interaction in space and time, and some problems of comparative social science history. E. Asian and Western European cases are juxtaposed and brought to bear on peasant marketing, urbanization, agrarian uprisings, ethnic mobilization, and revolution. Theories include classics from human geography, and contemporary approaches, e.g., system analysis, and the Annales School. Student research may utilize a geographic information system (GIS), available in the Regional Systems Laboratory, for analyzing and displaying quantitative data via computer generated maps.
3, 5, or 8 units, Spr (Hochberg) TTh 1:15-3:05

218. Seminar: Collective Action — Contemporary research on social movements and collective action. Compares 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 have attempted to account for rise and fall of social movement activity over time.
5 units, Spr (Olzak) T 3:15-5:05

219. Seminar: Comparative and Historical Sociology — How theoretical and comparative approaches allow the researcher to reconcile history with sociology. Possible topics: the rise of capitalism, nations and nationalism, social and political revolutions, urbanization, regime formation, international conflict.
5 units, Win (Hochberg) MW 9-10:30

230. Education and Society — For graduate students; see 130.
5 units, Spr (Meyer) TTh 10-11:50

233. Communications, Technology, and Society — For graduate students; see 133.
4 units, Spr (Nass) TTh 10-11:30

259. Sociology of Mortality and Fertility — Changes in mortality and fertility in the developed and developing world; historical and contemporary patterns. Interplay of social and demographic factors on basic demographic changes (i.e., transitions from high to low fertility) and their link to other demographic and social structures (i.e., marriage patterns, labor force structure, kinship patterns. Theories explaining changes and techniques for analyzing these relations.
5 units, Win (Herting) MW 2:15-4:05

SOCIAL PSYCHOLOGY AND INTERPERSONAL PROCESSES

220. Interpersonal Relations: Lectures and Seminars — For graduate students; see 120.
5 units, Aut (Ridgeway) TTh 11-12:15

222. Social Processes and Pathological Outcomes — Seminar on abnormal family and group processes resulting in emotional disturbances and behavioral disorders. The development of disorders in personality (or the self) from a social psychological or sociological point of view, emphasizing searching for the mechanism by which pathological inter-
personal interactions get translated into pathological self processes. Topics: the impact of experiences of neglect, abuse, molestation, violence, marital separation and divorce, war, and natural disasters on children and adults. Prerequisites: 120 (or 220) and 121, or consent of instructor.

5 units, Spr (Johnston) T 7–10 p.m.

223. 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 units (Ridgeway) given 1995–96

224. Interaction Processes in Education: Design and Evaluation — (Same as Education 312.) Educational applications of sociological/social psychological 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 evaluation. Methods of systematic evaluation and observation. Students receive practical experience in using these methods.

4 units, Aut (Cohen) MW 3:15–5:05

225. Social Psychology and Social Structure — For graduate students; see 121.

5 units, Spr (Staff) MWF 11

226. Legitimation, Ethnicity, and Status — Topics: the effects of power and legitimacy on responses to inequity; effects of family process on status attainment; status differentiation and the exchange of information; operation and interrelation of status, affect, and control as social processes. Prerequisite: 5, 120, 121, or consent of instructor.

5 units, Spr (Berger, Staff) TTh 2:15–4:05

227. Power, Gender, and Families — Topics: the effects of shared expectations on the exercise of power in interpersonal situations; homeless families and their children; social structure and productivity in short–term and permanent work groups; gender relations, reward expectations and the legitimation of power and prestige orders. Prerequisite: 5, 120, 122, or consent of instructor.

5 units (Berger) given 1995–96

229. Status, Expectations, and Rewards — The effect of status characteristics, race, and sex on the individual's interpersonal behavior: how status distinctions are maintained, how status distinctions determine an individual's performance expectations and expectations for rewards, how performance and reward expectations can be changed. Theoretical and empirical research on status characteristics theory is examined for an understanding of the dynamics that link status, performance and reward expectations, and behavior in interpersonal situations. Prerequisites: 5, 120, or consent of instructor.

5 units, Spr (Berger) W 2:15–5:05

257. Sociology of Mental Health — For graduate students; see 157.

5 units, Spr (Cronkite) TTh 11–12:30

STRATIFICATION AND INEQUALITY

232. Problems in Sociology of Education — (Graduate students register for 330; same as Education 210.) 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 learning, and the social structure of the classroom. Read and evaluate social sciences research. Short written assignments and individual feedback.

4 units, Win (E. Cohen) MW 3:15–5:05

240. Introduction to Social Stratification — For graduate students; see 140.

5 units, Spr (Szelenyi) TTh 9–10:30

243. Gender Stratification — For graduate students; see 143.

5 units (Szelenyi) given 1995–96

245. Seminar: Comparative Race and Ethnic Relations — Evaluation of theory and research on race and ethnic relations, including the study of the dynamics of race and ethnic boundaries, ethnic solidarity, assimilation, and causes of ethnic and racial conflict and protest in a variety of settings and across historical periods.

5 units (Olzak) given 1995–96

249. The Urban Underclass — For graduate students; see 149.

5 units, Spr (Olzak) TTh 11 section by arrangement

FORMAL ORGANIZATIONS

260. Formal Organizations — For graduate students; see 160.

5 units, Aut (Scott) MWF 9 section by arrangement

261. Organizational Ecology — For graduate students; see 161.

5 units, Aut (Hannan) MW 3:15–5:05

262. Organization and Environment — (Same as Business 672R.) Seminar considers alternative theoretical approaches useful for analyzing organiza-
tion-environment and interorganizational relations. Approaches: resource dependence, population ecology of organizations, and Williamson's markets and hierarchies. Perspectives analyze mergers and vertical integration, joint ventures, interlocking directorates, and organizational forms and structures. Prerequisite: consent of instructor.

5 units, Win (Fernandez)

263. Power and Politics in Organizations — (Same as Business 377.) The definition and usefulness of power and politics in organizational settings for understanding actions and outcomes. Relative power of subunits and individuals in terms of vertical power and authority differences and from the perspective of power differences that arise among subunits formerly on the same hierarchical level. Topics: the definition of power and politics, and whether power is a measurable and meaningful concept; the sources and determinants of individual and subunit power; how power is used in organizations, the conditions under which power and politics dominate organizational activity; the consequences of power and political activity; political tactics; and the implications of a political perspective for issues or organizational structure and design, the stratification of positions within the organization, and for organizational adaptation and change. Enrollment limited.

4 units, Win (Kramer)
Spr (Webb)

264. Organizations and Public Policy — For graduate students; see 166.

5 units, Win (Scott) MWF 9

section by arrangement

265. Cross-National Perspectives in Organizations — (Same as Political Science 207M, Business 380R.) Perspectives and research on organizations by foreign scholars and in non-American contexts. Emphasis is on identifying a few key concepts from the foreign literature and contrasting the points of view, research results, and experiences with those based on research in the U.S. Prerequisites: 160, Business 270, or Industrial Engineering 100; consent of instructor.

5 units, Win (March)

267. Institutional Analysis of Organizations — Reading and research on the nature, origins, and effects of the modern institutional system. Emphasis on the effects of institutional systems on organizational structure.

5 units, Win (Scott) T 2:15–5:05

POLITICAL AND COMPARATIVE/ HISTORICAL SOCIOLOGY

311A, B, C. Workshop: Comparative Systems — (Same as Education 387A, B, C.) Analysis of quantitative and longitudinal data on national educational systems and political structures. Prerequisite: consent of instructor.

2–5 units, Aut, Win, Spr (Meyer, Ramirez) by arrangement

312. Workshop: Ethnic Collective Action — Issues of research design, data gathering, measurement, and analysis of evidence on the occurrence of race and ethnic collective action. Prerequisite: consent of instructor.

3–5 units, Aut (Olzak) M 2:15–4:05

332. World, Societal, and Educational Change: Comparative Perspectives — (Same as Education 306D.) Analysis of the relations between educational and societal developments from a comparative perspective. Readings on theoretical perspectives and empirical studies on structural and cultural sources of educational expansion and differentiation, and on 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) MWF 11–12:30 and by arrangement

SOCIAL PSYCHOLOGY AND INTERPERSONAL PROCESSES

320. Foundations of Social Psychology — Major theoretical perspectives in interpersonal processes and social psychology. Basic principles, assumptions, and substantive problems associated with each perspective; techniques of investigation and methodological issues. Perspectives: symbolic interaction, social structure and personality, cognitive, and group processes.

5 units, Spr (Zelditch) W 2:15–5:05

STRATIFICATION AND INEQUALITY

330. Problems in Sociology of Education — (Same as Education 310.) For graduate students, see 232.

4 units, Win (E. Cohen) MW 3:15–5:05

340. Social Stratification — Classical and contemporary approaches to understanding the differential distribution of valued goods and the social processes by which such inequality comes to be seen as legitimate, natural, or desirable. Introduction to modern analytic models of the effects of social contacts, cultural capital, and "luck" in generating inequality; the role of educational institutions in perpetuating and undermining modern forms of stratification; the causes and consequences of stratification by race and gender; the structure of social classes, status groupings, and prestige hierarchies in past and present societies; the sources of "labor markets" and their functions in early and advanced industrialism; the implications of social stratification for individual lifestyles, consumption patterns,
and personality traits; and the rise of the “new class,” the “underclass,” and other emerging forms of stratification under post-industrialism.

5 units, Spr (Grusky) 11–12:15

341A,B,C. Workshop: Social Stratification—Stratification theory and research for advanced students. Discussions of 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, Win, Spr (Grusky)
Th 3:15–5:05

FORMAL ORGANIZATIONS

360. Foundations of Organizational Sociology — The core problems in the sociology of organizations, the main theoretical perspectives, and the research programs directed at evaluating these perspectives. Prerequisite: registration in a Ph.D. program.

5 units, Win (Hannan) M 2:15–5:05

361. Seminar: Social Psychology of Organizations—(Same as Business 671.) Selected curriculum issues in social psychology relevant to behavior in organizations. Prerequisite: consent of instructor.

5 units, Aut (Martin)

365. Social and Political Processes in Organizations—(Same as Business 676, Political Science 306.) Focuses on the organizational level of analysis and the problems of creating order, cooperation, and control. Topics: bureaucracy, informal organizations and networks, roles and bounded emotionality, groups and organizational decision making, organizational culture, organizational learning and change, power.

5 units, Win (March)

366A,B,C. 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, Spr (Hannan)
by arrangement

368A,B,C. Workshop on Organization of Medical Care — Workshop for designing, collecting, and analyzing data related to trends in health care organizations in the San Francisco Bay area. Prerequisites: 160, 260 or 360, and consent of instructor.

2–5 units, Aut, Win, Spr (Scott) T 2:15–4:05

SOCIOLOGICAL THEORY

370. Sociological Theory — Introduces theoretical strategies in sociological analysis selected from among functionalism, historical materialism, human ecology, the theory of action, symbolic interactionism, social phenomenology, decision theory, and behaviorism illustrated by one or more programs of theoretical research originating in the classical literature (e.g., Durkheim, Marx, Weber, et al) still active in the contemporary literature. Also, some elementary methods required to intelligently read and analyze theory.

5 units (Zelditch) given 1995–96

RESEARCH METHODS

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 metatheoretical assumptions, the derivation of logical implications from arguments, assessments of theoretically significant problems or gaps in knowledge, etc.

5 units, Win (Zelditch) W 2:15–5:05

380. Methods for Sociological Research — Same as 180 but restricted to Ph.D. candidates in Sociology or Sociology of Education.

5 units, Win (Benavot, Shenhav) MWF 1:15

381A. Sociological Methodology IA: Design and Analysis — Basic principles of research design and of descriptive, exploratory, and inferential statistics. Reviews basic math skills needed for advanced statistical training. An evaluation is given at first class meeting to determine whether students have the appropriate background. Alternate course: Statistics 190. Corequisite: 381B.

4 units, Aut (Herting) TWTh 11–1
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. An evaluation is given at first class meeting to determine whether students have the appropriate background. Prerequisites: 381B and 383, or equivalent.

4–6 units, Win (Herting) TWTh 11–1

385. 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 on the utility of multiple indicator approaches to social measurement.

5 units (Herting) given 1995–96

386. Seminar: Event History Analysis — Lectures/discussion on event history analysis and its application in social science research, plus hands-on experience with computer software for event history analysis. Exploratory and multivariate approaches. Topics: alternative approaches to time dependence and population heterogeneity. Estimation and testing. Parametric and semi-parametric models. Prerequisite: 383 or equivalent.

5 units, Spr (Tuma)

388. Log-Linear Models—Analysis of categorical data with log-linear, log-multiplicative, latent class, latent trait, Markov, Rasch, and related models.

5 units (Grusky) given 1995–96

GRADUATE INDIVIDUAL STUDY

390. Graduate Individual Study (Staff) by arrangement

391. Graduate Directed Research (Staff) by arrangement

392. Research Apprenticeship (Staff) by arrangement

393. Teaching Apprenticeship (Staff) by arrangement

394. Thesis (Staff) by arrangement


Director: Peter A. Sturrock
Associate Directors: Umrans S. Inan, Philip H. Scherrer, Robert V. Wagoner
Assistant Director: Roger W. Romani


Associate Professors: Bruce B. Lusignan, Peter F. Michelson
Assistant Professor: Roger W. Romani
Professors (Research): C–W. Francis Everitt, Philip H. Scherrer
Consulting Professor: Martin Walt

The center is an interdepartmental organization coordinating teaching and research in space science and astrophysics. Its members are drawn from the Departments 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 and Physics 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 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.
Many of these projects involve collaboration with scientists at the NASA/Ames Research Center and with scientists at the Lockheed Palo Alto Research Laboratory through the Stanford—Lockheed Institute for Space Research.

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 also a member of the Spectroscopic Survey Telescope Consortium that will share the operation of a 10.4 meter telescope to be built at the McDonald Observatory of the University of Texas.

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 Aeronautics and Astronautics, Applied Physics, Electrical Engineering, Engineering, Geophysics, and Physics.

AERONAUTICS AND ASTRONAUTICS

131. Experimentation in Aeronautics and Astronautics
212. Introductory Hypervelocity Aerophysics
213. Atmospheric Entry
236A,B,C,D. Spacecraft Design
279A. Space Mechanics
280. Rocket Propulsion Fundamentals
290. Problems in Aeronautics and Astronautics

APPLIED PHYSICS

312. Basic Plasma Physics
363. Solar and Solar—Terrestrial Physics

ELECTRICAL ENGINEERING

106. Planetary Exploration
249. Electromagnetic Probing of 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

15B. Cosmic Horizons
27. Evolution of the Cosmos
50. Astronomy Laboratory and Observational Astronomy
100. Introduction to Observational and Laboratory Astronomy
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
364. Advanced Gravitation
365. Extragalactic Astrophysics and Cosmology
460. Astrophysics Seminar
463. Special Topics in Astrophysics
Spaniard and Portuguese

Emeriti: (Professors) Fernando Alegria, Aurelio M. Espinosa, Jr., Bernard Gicovate, Isabel Magaña Schevill, Sylvia Wynter*; (Assistant Professor) Grace Knopp

Chair: Guadalupe Valdés

Director, Undergraduate Language Program: Maria-Paz Haro

Professors: Mary Louise Pratt, Michael P. Predmore (on leave), Jorge Ruffinelli, Guadalupe Valdés

Associate Professors: Wilfrido H. Corral, Yvonne Yarbro-Bejarano

Assistant Professor: Adrienne L. Martín

Professor (Teaching): Maria-Paz Haro

Courtesy Professor: Hans U. Gumbrecht (French and Italian, Comparative Literature)

Senior Lecturer: Karin Van den Dool

Lecturers: Irene Corso, Juergen Hahn, Alice Miano, María Sandoval

Visiting Professors: Auturo Arias (Winter), Francisco Caudet (Autumn), Jean Franco (Winter), Eduardo Galeano (Spring), Juan José Sanchez (Winter)

Visiting Lecturers: João Almino, Nelson F. de Carvalho

*Recalled to active duty, Spring

The Department of Spanish and Portuguese accepts candidates for the degrees of Bachelor of Arts, Master of Arts in Spanish and Portuguese, and Doctor of Philosophy in Spanish and Portuguese.

Students interested in Iberian and Amerindian languages not offered in this department should contact the Special Language Program, Department of Linguistics.

Undergraduate Programs

Bachelor of Arts

Recognizing that students have different interests and reasons for pursuing a major, the Department of Spanish and Portuguese offers the following major paths. Each has different objectives and requirements. Students should consider, in consultation with a faculty adviser, which major path corresponds most closely to their own personal and professional objectives.

Literature Emphasis—This path is recommended for those who enjoy reading literature and wish to acquire a knowledge of poetry, prose, and drama in the Hispanic world. Courses provide historical perspective and develop critical skills in approaching literature. Candidates complete a minimum of 50 units from courses in the department numbered 100 or higher.

Requirements: Spanish 140, Introduction to Methods of Literary Analysis; 170, Undergraduate Colloquium; 201 and 202, Advanced Grammar and Composition; 203, History of the Spanish Language; three courses in Peninsular literature; three courses in Latin American literature. Among the courses taken, two should be literature prior to 1750.

Recommended: Portuguese language and literature courses; Chicano literature; linguistics; literary theory.

Literature and Society Emphasis—This path allows a broader major than is possible in the other areas of concentration. The student can combine the study of Spanish, Portuguese, or Latin American literature with such fields as political science, history, anthropology, or economics. Students must complete a minimum of 40 units in the department from courses numbered 100 or higher, and 10 units in related fields with adviser approval.

Requirements: Spanish 140, Introduction to Methods of Literary Analysis; 170, Undergraduate Colloquium; 201 and 202, Advanced Grammar and Composition; three courses in Peninsular Literature; three courses in Latin American literature.

Chicano Studies Emphasis—This path allows concentration in Chicano Studies. Students acquire a broad knowledge of the roots of Chicano literature by taking courses designated Chicano Studies (CHST) and courses in, for instance, the Departments of Anthropology, History, or Linguistics. Candidates must complete a minimum of 50 units, including 10 units in Latin American and/or Peninsular literature from courses numbered 100 or higher in the department.

Requirements: Spanish 140, Introduction to Methods of Literary Analysis; 170, Undergraduate Colloquium; 201 and 202, Advanced Grammar and Composition; three courses in Chicano literature; four courses in Latin American and/or Peninsular literature.

Language Emphasis—This path is for students whose primary interest is in the structure and use of Spanish. Students must complete a minimum of 50 units from courses in the department numbered 100 or higher.

Requirements: Spanish 140, Introduction to Methods of Literary Analysis; Spanish 170, Undergraduate Colloquium; Spanish 201, 202, Advanced Grammar and Composition; Spanish 203, History of the Spanish Language; one course in introductory linguistics (in the Department of Linguistics); two courses in Spanish linguistics.

Recommended: two literature courses in one area; Portuguese language and literature courses.
SUGGESTED SEQUENCE

A series of core courses designed to fulfill the requirements for all the major paths are offered each year. All majors must take Spanish 140, 170, 201 and 202. Courses numbered 150-151 (Peninsular literature) and 160-161 (Latin American literature) are introductory survey courses which satisfy the minimum literature requirements for all the paths. After completion of 150-151 and/or 160-161, remaining courses should be taken at the 200 level.

The 130B, 131B, 132B series is recommended for bilingual students and/or students who do not wish to make literature their major area of concentration but wish to continue studying Spanish beyond the second-year level. This series does not fulfill major requirements.

It is also recommended that all Spanish majors take Portuguese 109R, Reading Portuguese for Speakers of Spanish, so as to acquire a basic reading knowledge of Portuguese. This is not a substitute for first- or second-year Portuguese but is intended to build skills for conducting research in the language.

HONORS PROGRAM

Spanish and Portuguese majors in the junior year, with a letter grade indicator (LGI) of ‘B+’ or better in all major courses, may apply to the honors program. Students should submit an Application for 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 and be accepted by 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 major adviser for more information.

EXTENDED MAJORS

Candidates for the A.B. in English and Spanish Literature or English and Portuguese/Brazilian Literature should register with the Department of English.

Extended majors in Spanish and Portuguese may be arranged through the adviser with other departments by taking a minimum of 50 units in Spanish and Portuguese from courses numbered 100 or higher, plus 15 or 20 units in a related field such as history, Latin American studies, etc.

For students in the honors program in Humanities, up to 6 units of that program may be applied toward completion of the Spanish major.

OVERSEAS PROGRAMS

IN BRAZIL, CHILE, SPAIN, AND PORTUGAL

For information on programs in Brazil, consult Dr. Van den Dool. For information on programs in Spain, consult Professor Haro. For information on programs in Portugal, consult Nelson de Carvalho. To transfer credits from programs abroad, consult the Office of the Registrar.

For information on the Stanford Program in Santiago, contact the Overseas Studies Program in Sweet Hall. A limited amount of credit for courses taken in Santiago may be applied to the major.

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 for bilingual students wishing to concentrate on special problems of language or who have particular cultural interests. For specific courses, consult the course offerings section. The suffix B in course numbers below 200 indicates bilingual 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 Prof. Haro.

COTERMINAL A.B. AND A.M.

The requirements for the coterminal A.M. 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, 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 letter grade indicator (LGI) of 'B' or above.

Requirements: Spanish 201, 202, Advanced Grammar and Composition or waiver by examination; one linguistics course (203, 204, 205, 206, 207); 301, Methods of Teaching Spanish; 306, Introduction to 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 unless specially designated.

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 letter grade indicator (LGI) of 'B' or above; units completed toward the A.M. degree can be counted for the Ph.D.; (2) Spanish 201 and 202, Advanced Grammar and Composition or waiver by examination; 203, History of Language or equivalent course in Spanish linguistics; 301, Methods of Teaching Spanish, and 306, 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 six 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 unless specially designated. For basic residency and candidacy requirements, see the "Advanced 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 with the Language Program Director 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, Methods of Teaching Spanish, in the Spring Quarter of 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) Spanish Linguistics.

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 departmental course offerings, students may take relevant courses with the approval of their adviser in other departments and programs, such as the Graduate Program in Humanities, Comparative Literature, Modern Thought and Literature, Feminist Studies, or History. 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 course work and teaching are 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 submit a term paper of approximately twenty 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 (15-20 pages, written in English), 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 letter grade indicator (LGI) of 'B' or above, selected from courses numbered 200 or higher. Spanish 201 and 202 (or waiver by examination) are required.

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 OVERVIEW
1. First- and Second-Year Spanish (1-99)
   - Culture and Bilingual (130-139)
   - Literature (140-198)
   - Chicano Literature 180-189
   - Individual Work (199)
2. Courses for Advanced Undergraduates and Graduates (200-299)
   - Advanced Language, Linguistics, and Theory (200-210)
   - Peninsular Literature (211-239)
   - 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 (240-247)
   - National and Regional Literatures (248-254)
   - Genres and Literary Movements (255-271)
   - Individual Authors (272-279)
   - Chicano Literature (280-289)
   - Special Topics (290-298)
   - Individual Work (299)
3. Graduate Seminars (300-399)
   - Linguistics, Methodology, and Literary Theory (300-313)
   - Peninsular Literature (314-339)
   - Latin American Literature (340-379)
   - Chicano Literature (380-389)
   - Special Topics (390-398)
   - Individual Work (399)
   - Dissertation Research (802)
4. Portuguese Program (1-399)
   - Language and Culture (1-199)
   - Portuguese Literature (211-239)
   - Brazilian Literature (240-279)
   - Individual Authors (280-289)
   - Special Topics (290-298)
   - Individual Work (299)
   - Graduate Seminars (300-398)
   - Individual Work (399)
   - Dissertation Research (802)

All courses are taught in Spanish or Portuguese unless otherwise noted.

SPANISH LANGUAGE PROGRAM
Students registering for the first time in a first- or second-year course should take a placement test if they studied Spanish before entering Stanford. Students who have passed the AP exams with a 4 or 5 are exempted from the test but must register in Spanish 13 or above in order not to lose their 10 units of AP credit. Students who passed the AP exam with a 3 should take the placement test and receive 5 units of AP credit if placed in Spanish 12 or above. For 11B, 12B, and 13B, see the special section for bilingual students.

Auditors are not permitted in language courses.

INTRODUCTORY

Note: A letter grade indicator (LGI) of ‘C’ or better is required to enter the next higher course in the language sequence.
1. First-Year Spanish (1st Quarter) — A proficiency-oriented introduction emphasizing speaking and oral comprehension.
   5 units, Aut, Win, Spr (Staff) MTWThF plus language lab

2. First-Year Spanish (2nd Quarter) — As above, with additional development of reading and writing skills, and cultural readings. Prerequisite: 1 or equivalent.
   5 units, Aut, Win, Spr (Staff) MTWThF plus language lab

3. First-Year Spanish (3rd Quarter) — As above, with additional cultural and/or literary readings. Prerequisite: 2 or equivalent.
   5 units, Aut, Win, Spr (Staff) MTWThF plus language lab

10. Elementary Conversation — Conversation practice supplementing 2 or 3. May also be taken when student intends to continue in first-year series but current course load does not permit. Prerequisite: 1 or equivalent.
    2 units, Aut, Win, Spr (Staff) TTh

11. Second-Year Spanish (1st Quarter) — Intensive review of grammar concepts; composition and conversation based primarily on cultural and literary readings. Prerequisite: 3 or placement test.
    4 units, Aut, Win, Spr (Staff) MTWTh

12. Second-Year Spanish (2nd Quarter) — Continuation of 11. Prerequisite: 11 or placement test.
    4 units, Aut, Win, Spr (Staff) MTWTh

13. Second-Year Spanish (3rd Quarter) — Application of grammatical concepts to composition, conversation, and oral presentation. Advanced readings. Prerequisite: 12 or placement test.
    4 units, Aut, Spr (Staff) MTWTh

15. Intermediate Conversation — Recommended as complement to second-year courses. Prerequisite: 3 or equivalent.
    3 units, Aut, Win, Spr (Staff) MWF

100. Advanced Conversation — May be taken twice for credit but counted only once for the major. Prerequisite: 13 or equivalent.
    3 units, Aut, Win, Spr (Staff) MWF

FOR BILINGUAL STUDENTS

Designed to meet specific linguistic needs of the bilingual student. See also 130 sequence.

11B, 12B, 13B. Second-Year Spanish for Bilingual Students — Series for bilingual students of Hispanic background and others with equivalent language skills who wish to refine command of the language and to enlarge vocabulary. Short readings by and about Chicanos and other Hispanics in the U.S. Slides, tapes, videos, and films.
    4 units, Aut, Win, Spr (Sandoval) MTWTh

162B. Chicano Literature: Creative Writing for Bilingual Students — Not open to graduate students or freshmen. Basic creative writing. Students are encouraged to draw from their bicultural, bilingual experience. Knowledge of Spanish and familiarity with barrio dialects essential.
    5 units

SPECIAL

1A. Accelerated First-Year Spanish Part 1 — Accelerated, proficiency-oriented; recommended for students who have some previous knowledge of Spanish, or for those with background in a Romance language. Equivalent to the first half of the regular first-year sequence.
    5 units, Aut (Staff) MTWThF plus language lab

2A. Accelerated First-Year Spanish Part 2 — Continuation of 1A. Equivalent to the second half of the regular first-year sequence. Students completing 1A/2A may enroll in 11.
    5 units, Win (Staff) MTWThF plus language lab

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 own pace, working with text and tapes. Instructor is available for consultation on a regular basis. Students who complete more than one course (5 units) of 1S, 2S, 3S must complete 10, or pass a first-year oral proficiency examination. Enrollment limited. Consent of instructor required.
    3-10 units, Win (Hahn)

5A. Intensive Beginning Spanish — Proficiency-oriented instruction in comprehension, speaking, reading, and writing the language and exposure to Hispanic cultures through short readings, games, newspapers, and videos. Daily work in language lab required. Enrollment limited to 15. Equivalent to Spanish 1 and 2. No auditors
    9 units, Sum (Staff) MTWThF 9-12

5B. Intensive Beginning Spanish — Continuation of 5A. Equivalent to Spanish 3, allowing completion of entire first year in ten weeks if taken with 5A. Enrollment limited to 15. No auditors.
    4 units, Sum (Staff) MTWThF 9-12

11A. Accelerated Second-Year Spanish, Part 1 — Proficiency-oriented, accelerated; recommended for students who have completed one year of college Spanish (or the equivalent) whose progress would best be served by intensive study. Equivalent to the first half of the regular second-year sequence.
    5 units, Win (Staff) MTWThF

12A. Accelerated Second-Year Spanish, Part 2 — Continuation of 11A. Equivalent to the second half
of the regular second-year sequence. Students completing 11A/12A may enroll in 100-level classes.
5 units, Spr (Staff) MTWThF

50. Reading Spanish—Intensive instruction designed to fulfill the University Ph.D requirement of a reading knowledge of Spanish. Students must earn an LGI of at least 'B' to fulfill the requirement.
3 units, Spr (Staff)

99. Individual Work—For special projects. Cannot be taken as a substitute for any of the regularly scheduled language courses.
1-5 units (Staff) by arrangement

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. Does not fulfill University language requirement.
3 units, Aut, Win, Spr (Corso)

125. Spanish for the Professions—Helps to prepare for the proficiency exam which must be passed in order to obtain the official transcript notation certifying foreign language proficiency. Provides a solid basis for professional oral and written communication; reading and discussion of career-related materials. use of TV newscasts for listening comprehension, development of specialized lexicons. Extra unit for individual project. Prerequisite: 13 or equivalent.
4-5 units, Win (Staff)

CULTURAL PERSPECTIVES

For students who do not anticipate a literature major but want to continue beyond the second year. May not be used for major credit.

Readings and topics for discussion and composition begin with a focus on Spain and include socio-cultural and historical material from Latin America, and the Mexican-Chicano, Puerto- rriqueño, and Cubano heritages, and develop critical perspectives on issues affecting a bilingual-bicultural reality. For special courses in Chicano literature and history, see courses numbered 280-289. Prerequisite: 13 or consent of instructor.
3-5 units, Aut (Martin)

130B, 131B, 132B. Cultural Perspectives—For non-majors, bilingual students, and others interested in the culture of Spanish speakers. Art, current events, folklore, history, language, and literature of Spain (130B), Latin America (131B), and Mexico and the Hispanic Southwest (132B). Lectures supplemented by slides, movies, tapes, and occasional field trips. Need not be taken in sequence. Extra unit for individual project.
3-5 units, Spr (Martin)

130B. Spanish Cultural Perspectives—DR:7(2)
4 units, Aut (Haro)

131B. Hispanic American Cultural Perspectives
4 units, Win (Sandoval)

132B. Mexican and Chicano Cultural Perspectives—(Same as Chicano Studies 132B.)
4 units, Spr (Sandoval)

LITERATURE

Lower-division courses provide a broad perspective on Hispanic literature, an introduction to literary studies, and prepare for more specialized 200-level courses. Prerequisite: 13 or equivalent.

140. Introduction to Methods of Literary 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 or equivalent. DR:7(2)
3-5 units, Aut (Corral)

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. Need not be taken in sequence. Content varies each year. Prerequisite: 13 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, Gongora, Lope de Vega, Calderon. DR:7(2)
3-5 units, Aut (Martin)

151. Spanish Literature II—Representative works of Spanish literature from the 1830s to the 1930s: Larra, Espronceda, Bécquer, Galémis, 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.
DR:7(2)
3-5 units, Win (Martin)

154. Exemplary Short Fiction in Spanish Renaissance—The notion of exemplarity as discursive and moral mechanism is analyzed in representative short stories from early modern Spain (Cervantes, María de Zayas, and the Moorish romance El Abencerraje). Issues of identity and subjectivity, genre and gender within a sociohistorical context.
3-5 units, Spr (Martin)
160-161. Spanish American Literature — Introductory survey with major works from several periods and genres. Need not be taken in sequence. Content varies each year. Prerequisite: 13 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. DR:7(2)
3-5 units, Win (Corral)

161. Spanish American Literature II — Continuation of 160, from independence to the present. Readings: El matadero, Maria, Santa, Los de abajo, Cien años de soledad, El aleph, and Gringo viejo. DR:7(2)
3-5 units, Spr (Corral)

170. Undergraduate Colloquium: Contemporary Spain — The Challenges of Change — Focuses on the socio-cultural study of post-war Spain, the transition years to the present. Topics: Spain’s role in Europe, the rebirth of separatism, the changing role of the Church, moral repression, and sexual liberation viewed through literature, cinema, journalism, and the arts.
3-5 units, Win (Haro)

175. Conquest of the Americas: Pasado y Presente — Works include: Alejo Carpentier, El Arpa y la Sombra; Bartolomé de las Casas, The Destruction of the Indies; Bernal Díaz del Castillo, Historia verdadera de la conquista de la Nueva España; Columbus, Four Voyages to the New World; Cortés, Five Letters; Werner Herzog, Aguirre and Wrath of God; Abel Posse, The Dogs of Paradise. Poems and performance pieces on La Malinche.
3-5 units, Win (Franco)

178. Fiction and Political Imagination: Latin American Novels in Translation — Over the last 25 years, Latin American novelists have produced reflections on the workings of power in the social world. The problem of imaging the state; intersections of state, family, and patriarchy; the workings of fear; resistance; the representations of violence; and alternative social worlds in works by Allende, Roa Bastos, Fuentes, Partnoy, Puig, Valenzuela, and others. Readings in English, but required in Spanish for majors.
3-5 units (Pratt) not given 1994-95

179. Contemporary Thought in Latin America — (Same as Latin American Studies 186.) Undergraduate seminar. Reading/discussion of leading currents of social and political thought. Limited enrollment. Prerequisite: consent of instructor by application at Bolivar House.
5 units, Spr (Galeno)

180. Introduction to Chicano Life and Culture — (Same as Chicano Studies 110, Religious Studies 143.) Interdisciplinary examination of the history and culture of Mexicans in the U.S. Emphasis is on literature and religious studies. DR:3
5 units, Aut (Yarbro-Bejarano, Bustos)

186. Modern Chicano/a Fiction — (Same as Chicano Studies 198, Comparative Literature 196.) Readings of novels and short fiction by Rudolfo Anaya, Ana Castillo, Denise Chávez, Sandra Cisneros, Roberta Fernández, Arturo Islas, and Tomás Rivera. The evolution of Chicano/a literature; aspects of the Chicano/a historical and literary experience; themes such as the search for identity, mestizaje, problems of language use and choice, invisibility, silence, blindness, and gender as it relates to issues of ethnicity and class. Students add their own observations and discoveries.
4-5 units, Win (Espinosa)

190A. Peter’s Seminar: Don Quijote — For sophomores only. Close reading of the first “modern novel” in Western prose fiction in relation to the principal literary traditions and cultural forces of the European Renaissance, and within the specific socio-historical context of Golden Age Spain. In English; readings in either Spanish or English. Enrollment limited to 10. Application procedure required.
3-5 units, Win (Martin)

190C. Peter’s Seminar: Mexico in Arms: From the Mexican Revolution (1910) to Chiapas (1994) — For sophomores only. In Mexico’s third revolution (1910-1920), one million people were lost. Revolution was then “instituted” peacefully through the Partido Revolucionario Institucional until 1994 when rebels took up arms in Chiapas. The causes of the Chiapas uprising and whether revolution is necessary for social change. The portrayal of revolution through literature and cinema. Readings: Mariano Azuela, The Underdogs; Carlos Fuentes, The Death of Artemio Cruz, and several essays. Films: Mexico Insurgente, The Underdogs, La Soldadera. Application procedure required.
3-5 units, Aut (Ruffinelli)

199. Individual Work — Open only to majors in Spanish, or by consent of instructor.
1-12 units (Staff) by arrangement

FOR ADVANCED UNDERGRADUATES AND GRADUATES

ADVANCED LANGUAGE, LINGUISTICS, AND THEORY

201. Advanced Grammar — Study of grammar at an advanced level.
3 units, Aut (Sandoval)

3 units, Win (Haro)
203. History of the Spanish Language—Study of 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 this development.

3-5 units (Valdés) not given 1994-95

204. Introduction to Spanish Linguistics—The basic conceptual foundations of linguistics. The complexity and systematicity of language in general, emphasizing Spanish. Topics: phonetics, phonology, morphology, syntax, semantics, language acquisition, language variation, and language change.

3-5 units (Valdés) not given 1994-95

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) not given 1994-95

206. Spanish Use in Chicano Communities—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) not given 1994-95

207. Theory and Issues in the Study of Bilingualism—(Same as Education 149X/249.) Fulfills linguistics requirement. Key issues in the study of bilingualism from a sociolinguistic perspective. Emphasis 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)

208. Theory of Literature and Society in Latin America—Analysis of themes and problems occurring in Latin American critical writings: acculturation and transculturation, eurocentrism or autonomy, historical periods and genres, literature nomenclature and the concept of America.

3-5 units (Ruffinelli) not given 1994-95

**PENINSULAR LITERATURE**

216. Don Quijote I—Don Quijote in relation to the principal literary traditions and cultural forces of the European Renaissance.

3-5 units (Martín) not given 1994-95

217. Don Quijote II—Continuation of 216.

3-5 units (Martín) not given 1994-95

222. Literature and Society in 19th-Century Spain—Representative literary figures of 19th-century Spain: Larra, Espronceda, Zorilla, Bécquer, and Galdós. Major directions in modern lyric poetry and in the modern realist novel studied against the background of Napoleonic invasions, loss of overseas colonies, two Carlist civil wars, and frustrated attempts to establish the First Spanish Republic. Emphasis on close textual analysis.

3-5 units (Predmore) not given 1994-95


3-5 units (Predmore)

224. The Spanish Republic, the Civil War, and the Aftermath—Significance of the Civil War for Spanish, European, and world history; the International Brigades. 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, Goytisolo, and Santos.

3-5 units (Predmore) not given 1994-95

228. Spanish Theater—The nature and significance of the Golden Age comedia as genre, national institution, mass entertainment, and force for social cohesion. Themes of honor, love, limpieza de sangre, cross-dressing, and wife murder, are studied in the sociohistorical context of counter-Reformation Spain. Lope (La dama bobla, Peribáñez); Calderón (El alcalde de Zalamea, El médico de su honra); Tirso (Don Gil de las calzas verdes); Caro (Valor, agravió y mujer); Cervantes (Entremeses).

3-5 units, Spr (Martín)

230. Golden Age Picaresque Novel—Focus is on major Golden Age picaresque novels and “deviant” varieties. Applicable genre theories, the genre’s relationship with other literatures, and the relationship to historic-social forces. Issues of honor, limpieza de sangre, women’s voice, and institutional control.

3-5 units

231. The Sonnet in Hispanic Literature—The structure of the sonnet and its history since Santillana in the 15th century. The Golden Age in Spain and Spanish America and the innovations of the Modernista period and of the 20th century.

3-5 units
232. Lyric Poetry from the Middle Ages to the Baroque—The tradition of popular and learned lyric poetry from its origins in the Middle Ages through the Renaissance and Baroque periods. The poetry of love, metaphysics and humor: jarchas, Arcipreste de Hita, Jorge Manrique, romanceros, Garcilaso, Fray Luis, San Juan, Lope de Vega, Góngora, Quevedo. Coordinates with 233.

3-5 units (Martin) not given 1994-95

233. Modern Peninsular Poetry—Representative works from 19th- and 20th-century Hispanic poets (Bécquer, Unamuno, Lorca, and others) illuminating figurative language, image, symbol, metaphor, irony, meter, meaning, idea. Coordinates with 232.

3-5 units (Predmore) not given 1994-95


3-5 units, Aut (Caudet)


3-5 units (Martin) not given 1994-95

238. The Spanish Portray Spaniards: 19th-Century Literatura Costumbrista—"Costumbrismo" is a literary style that deals with national customs, prominent 1800-1850, but still used by modern columnists (Francisco Umbral of El Mundo). Authors of costumbrismo often used pseudonyms. Texts from newspapers and magazines reveal the social customs and daily life of the 19th century, the evolution of the history of mentality as reflected by changes in the perception of time, and in the phenomenology of sight brought on by advances in technology.

3-5 units, Win (Sanchez)

LATIN AMERICAN LITERATURE

240. First Images of America in Colonial Prose—Overview of European impressions and assumptions of America on encounter and initial contact. Problems of reading these texts, fiction vs. history, the noble savage, the semiotics of quests, utopianism/materialism, and the point of view of the conqueror. Works by Columbus, Cortés, Bernal Díaz, Las Casas, Sagahún, and selected historiographical texts.

3-5 units (Corral) not given 1994-95

243. Taste, Wit, and What? in Spanish American Baroque—Three concepts/doctrines which guided Baroque poetics in Spanish America studied as phenomena that escaped traditional analysis. The social background and aesthetic theories underlying the Baroque prose and poetry of Sor Juana, Balbuena, Del Valle Caviedes, and Bolaños.

3-5 units (Corral) not given 1994-95


3-5 units (Corral) not given 1994-95

248. The Caribbean-Americas: An Introduction to Their Literature, Thought, and Cultural Worlds—Literature, thought, and popular cultures of the Caribbean Basin within the context of an overview of its multiple cultural and linguistic worlds.

3-5 units, Spr (Wynter)

253. Mexican Short Story—Focuses on the Mexican cuento as expressive of national and cosmopolitan values in works by Arreola, Garro, Pacheco, Poniatowska, Revueltas, and Ruflo.

3-5 units


3-5 units

258. The Short Novel as Genre in Latin America—Focuses on the Mexican cuento as expressive of national and cosmopolitan values in works by Arreola, Garro, Pacheco, Poniatowska, Revueltas, Ruflo.

3-5 units

259. Contemporary Latin American Short Story—A question of canons. Selected stories by Quiroga, Borges, Cortázar, and Monterroso, examined within the theory of what is a minor literature.

3-5 units (Corral) not given 1994-95

261. The Avant Garde Novel in Latin America—Survey of the neglected but increasingly important Avant Garde period of the 1920s and '30s. Readings: Owen, Novela como nube; Vela, El café de nadie; Palacio, El hombre muerto a puntapiés; Adán, La casa de cariño; F. Hernández, El caballo perdido; Villaurrutia, Dama de corazones; Torres Bodet, Margarita de Niebla.

3-5 units (Ruffinelli) not given 1994-95

262. The Origins of the New Latin American Novel—Several works of the 1920s form the foun-
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

282. Chicano Poetry — Readings of lyrical and social Chicano/a poetry. Representative poetic works are used to discover how personal and social experiences are manifested through poetry. Readings: Alurista, Santiago Baca, Castillo, Corpi, Herrera, Soto.

3-5 units

283. The Contemporary Chicano Novel — Textual analysis and critique of the contemporary Chicano novel of the last two decades. Emphasis is on works within the context of the social reality of the Chicano and his community. Readings: Rivera, Anaya, Méndez, Islas, Castillo.

3-5 units

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. In English.

3-5 units, Spr (Yarbro-Bejarano)

286. Chicano Theater — Examines 19th- and early 20th-century antecedents to Chicano theater. El Teatro Campesino, El Teatro de la Esperanza, and other U.S. and Latin-American political theater groups/movements which influenced Chicano theater and were in turn shaped by Chicano theatrical paractices, (the SF Mime Troupe, Augusto Boal, Enrique Buenaventura) and Mexican groups (Teatro Zero). The emergence of women’s and gay and lesbian voices, beginning with the history of the Women’s Caucus within the national Chicano theater organization TENAZ, early teatropoesia works (Tongues of Fire), and Edgar Poma’s coming-out drama The Reunion. Chicana/Latina playwrights, (Scott, Moraga, Lopez.)

5 units, Win (Yarbro-Bejarano)

SPECIAL TOPICS

291. “Race,” Discourse, and the Origin of the Americas: A New World View of 1492 — Examines the Event of 1492, the prelude voyage of the Portuguese around Cape Bojador to W. Africa, the formation of a new legitimating basis for structures of New World societies; analyzes juridico-theological, historical, and literary texts from the perspective of the Americas; the politics of representation in orthodox interpretations and the strategies whereby a symbolic construct
of “race” would take primary place in the New World instead of the “gender” construct of previous human societies. In English

3-5 units (Wynter) not given 1994-95

292. Spain in America/America in Spain—Concentrating on texts from the Spanish Golden Age and contemporary Spanish American literature, investigates the cultural intricacies and problems of reception inherent in the encounter of Spain and Spanish America. How the processes of understanding a different culture can become part of the social, political, and historical tradition of conqueror and conquered. Essays, poetry, and the theater.

3-5 units (Corral, Marín) not given 1994-95

293. Spanish Cinema: From Surrealism to the Postmodern—Spanish cinema beginning with the Franco dictatorship, through the transition to contemporary democratic Spain. The works of internationally-known directors, including Guiterrez Aragon, Bardem, Bunuel, Saura, and the generation of Almodovar and the basque, catalan, and gallego filmmakers. The relationship of film to literature and the socio-political realities of Spain.

3-5 units (Haro) not given 1994-95

294. Latin American Cinema: Ripstein 3-5 units (Ruffinelli) not given 1994-95

295. Cinema, Literature, and Politics in Latin America—The relationship between the cinematic arts and politics examined through films and videos from Cuba, Venezuela, Argentina, Peru, and Mexico. Depiction of issues such as slavery, dictatorship, and liberation movements.

3-5 units (Ruffinelli) not given 1994-95

296. Contemporary Central American Narrative and Testimonial Literature—Shifting patterns in Central America imply the reexamination of a cultural consciousness that systematizes thinking. Critical study of fundamental questions about the nature of culture and how it synthesizes systems of thought and subjective beliefs through the means of fictional and testimonial discourse in Central America. How a society thinks about itself in the process of responding to social crisis.

3-5 units, Win (Arias)

299. Individual Work—Open to undergraduates or graduates majoring or minoring in Spanish. May be repeated for credit.

1-12 units, any quarter (Staff) by arrangement

GRADUATE SEMINARS

Open to undergraduates with consent of instructor.


3-5 units, Spr (Haro)

306. Introduction to Literary Theory and Criticism—Discussion of major currents in contemporary criticism. Topics and readings vary each year. In English

4-5 units

307. Latin American Cultural Theory—Introduction to recent work in cultural theory and cultural studies in Latin America. Topics: popular cultures and modernity, the semiotics of the authoritarian state, Latin American postmodernism, the megalopolis, indigenous peoples and the renegotiation of the national.

3-5 units (Pratt) not given 1994-95

309. The Modern Tradition: 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. In English

3-5 units (Pratt) not given 1994-95

310. Discourse and Ideology—Creation of meaning as a social process, ways in which ideology is produced, reproduced, and transformed in linguistic interaction, whether and how American competence models can interlock with theories that see language as constituting social reality and self. Readings on the concept of socially determined meaning, discursive practices in the French tradition, British empirical analyses, American sociolinguistics. In English

4-5 units (Pratt) not given 1994-95

312. Novelists as Theorists—The writings of Spanish American novelists on their own works, those of other Spanish American novelists, and on the novel as a genre. Texts analyzed within the context of generic theories of Auerbach, Lukács, Bakhtin, Hutcheon, and Spilka/McCracken-Flesher’s collection *Why the Novel Matters*. Novels by Carpentier, Fuentes, Vargas Llosa and Saer are studied in conjunction with critical articles by their main interpreters.

3-5 units (Pratt) not given 1994-95

317. Women and Transgression in The Spanish Renaissance—The depiction of marginal/exceptional women in Renaissance Spanish literature as recurring transgressive types who violate accepted gender roles (as procuress, prostitute, writer, church-
woman, gypsy, soldier, cross-dresser, etc.), and who sabotage the division of socially assigned functions of the gendered self into "masculine" and "feminine." Authors: Rojas, Cervantes, Santa Teresa, Zayas, Catalina de Erauso, Ana Caro.

3-5 units, Win (Martin)

318. Don Quijote
3-5 units (Martin) not given 1994-95

319. Miguel de Cervantes Saavedra — Cervantes as social and literary dissident. Study of works exclusive of Don Quijote; Cervantes's position with respect to the literary currents of the Renaissance and the concept of literary modernity: poetry, La Galatea, Comedias y entremeses, Novelas ejemplares, Viaje del Parnaso, Persiles y Sigismunda.
3-5 units (Martin) not given 1994-95

3-5 units (Martin) not given 1994-95

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 Generation of 1898, Modernism, Krausism, pure poetry, and symbolic system.
3-5 units (Martin) not given 1994-95

337. Ramón del Valle-Inclán — 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 on Valle as a major force in aesthetic innovation and social criticism.
3-5 units (Predmore) not given 1994-95

3-5 units, Aut (Caudet)

341. Colonial Prototypes of the Spanish American Novel — A revision of what was a novel during the colonial period is posited through the studies of Cabeza de Vaca’s Naufragios, Sigüenza y Gongora’s Infortunios de Alonso Ramírez, Rodriguez Freile’s El carnero and Carrié de la Vandera’s El lazarillo de ciegos caminantes. Critical literature that proposes other works as models or novels is analyzed.
3-5 units (Corral) not given 1994-95

342. Writing and Re-Writing: Colonial Literature in Contemporary Narrative — Intertextual use of the chronicles of discovery. The Conquest examined in contemporary narrative as an aesthetic and ideological vehicle that questions historical knowledge and language as a means of expression. Notions of repetition, imitation, and dependency are studied in Columbus, Carpentier, Sarduy, Posse, and Saer.
3-5 units (Corral) not given 1994-95

343. Colonial Culture and Society: The Mexican Baroque — Baroque subjectivity and how subjectivity might have been constituted in the 17th century. Focus is on Sor Juana’s writing in relation to the “learned ignorance” of mystical nuns, in relation to courtly convention, and in relation to current aesthetic theories, especially those of Gongora and Gracian.
3-5 units, Win (Franco)

3-5 units, Spr (Corral)

360. Gender, Race, and Nation in 19th-Century Latin America — Readings of major writers of the 19th century, emphasizing their relation to projects of nation-building and decolonization.
5 units (Pratt) not given in 1994-95

5 units (Pratt) not given 1994-95

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; women’s inferiority and 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, Menchú, Mercado, Murillo, Peri-Rossi, Poniatowska, Traba, Valenzuela, with readings in history and social analysis.
5 units (Pratt) not given 1994-95
370. Public and Poles in Contemporary Intellectuals—The polemics surrounding the alliances of Spanish American writers on different sides of the political spectrum examined in the essays and fiction of Arenas, Benedetti, Cortázar, Vargas Llosa, and Heberto Padilla, whose case marks a watershed for Spanish American intellectuals. Historical approach provides a necessary chronological discussion of other players.

3-5 units (Corral) not given 1994-95

375. José Revueltas and Mexican Marxist Ideology and Aesthetics—Revueltas, the most important non-canonical Mexican writer since the post-war period, expressed in his novels, short stories, and essays a political concern for Mexico and for the international class struggle. Highlights of his political and literary profile in the context of contemporary Mexican history.

3-5 units (Ruffinelli) not given 1994-95

377. Nationalism and Post-Nationalism: A Seminar on Literature, Art, and Cinema—Current debates about nationalism and post-nationalism could be a terrain for neo-colonialism in Latin America in the era of NAFTA and other international projects. Focus is on the concept and representation of nation and nationalism in Latin America (Mexico, Cuba, Argentina, and Venezuela) since 1800. Influential works of literature, art and cinema, and important theoretical and historical texts written by Latin Americans.

3-5 units Spr (Ruffinelli)

384. Intersections of “Race,” Sexuality, and Nation

3-5 units (Yarbro-Bejarano) not given 1994-95

385. Chicano/a Literature: Moraga and Anzaldua—In-depth textual and contextual analyses of the works of Cherríe 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 presentation of readings and papers. Goal is to produce a paper suitable for publication or presentation at a conference.

3-5 units (Yarbro-Bejarano) not given 1994-95

386. Chicano/a Poetry—(Same as Comparative Literature 350.) Traces Chicano/a poetry from its earliest appearance as part of the Hispanic-American oral tradition, its publication in the Spanish language newspapers of the Southwest, to its modern evolution as a component of the American poetic canon. Theory of poetry in general and applications to the case of Chicano poetry in particular.

Works by Alurista, “Corky” Gonzales, Montoya, Saenz, Alarcón, Gaspar de Alba, Cisneros.

4-5 units, Spr (Espinosa)

387. Feminists Write Race—Feminist criticism and theory involving race and an in-depth analysis of women-authored texts, providing a diverse collective intellectual and cultural project. Works of Chicana critics, including instructor’s, applied to the writing of Cherríe Moraga and Gloria Anzaldúa. Possible readings of the “writing communities” of women of color in the U.S., Latin American feminists, or white feminists’ interrogation of whiteness. Students lead discussion on readings and workshop-style critique of papers. Goal is to produce a paper suitable for publication or conference presentation.

3-5 units, Aut (Yarbro-Bejarano)

390. Humor in Hispanic Literature—Manifestations of humor in Peninsula literature from medieval times to the present. Comic poetry is discussed; emphasis is on prose. Primary texts are analyzed in the light of theoretical works (Bakhtin, Foucault, Bergson, Cole, Levin) to establish a poetics of Hispanic humor.

3-5 units (Martin) not given 1994-95

391. Humor in Latin American Literature—Satire and other comic forms of literature as a political force for reform in 19th- and 20th-century Latin American writings.

3-5 units (Ruffinelli) not given 1994-95

392. An Exceptional Publicist: José Ortega y Gasset—Ortega y Gasset’s ideas on cultural policy and his talent as a publicist. His obsession with discourse and his avant garde perspective on philosophy and sociology. His affiliation with organizations such as “The Spanish League of Political Education” (1913) and “The Body of Partisans to the Republic”, journalists such as Gregorio Marañón and Ramón Pérez de Ayala, and publications such as Faro (1907), España (1915), El Sol (1917), Revista de Occidente (1923) and the Editorial Calpe (1919).

3-5 units, Win (Sanchez)

394. Seminar: Narratology—Myth, Fiction, and History—(Same as Comparative Literature 349, French and Italian 349E.) Recent theories of narrative, the cognitive status of stories in myth, fiction, autobiography and historical writing, the social function of storytelling, and the attack on narrative as the substance of ideology in certain modernist and postmodernist writings. Works by critics (Lukacs, Levi-Strauss, Bakhtin, Frye, Barthes, Ricoeur, De Man, Todorov, Gadamer); and their theories as applied to literary works by such writers as Balzac, Poe, Conrad, Mann, Woolf, Pynchon, et al. Fulfills graduate theory requirement.

5 units, Win (White)
397. Contemporary Latin America: A Critical View — (Same as Latin American Studies 305.) Critical analysis of contemporary issues in Latin America, as seen by leading writers, artists, and other intellectuals. Limited enrollment. Prerequisite: consent of instructor by application at Bolívar House.
5 units, Spr (Galeano)

399. Individual Work — Exclusively for graduate students in Spanish engaged in special work.
1-12 units, any quarter (Staff) by arrangement

PORTUGUESE LANGUAGE PROGRAM

INTRODUCTORY

1. First-Year Portuguese (1st Quarter) — Follows a proficiency-oriented approach emphasizing speaking and oral comprehension; also serves as an introduction to aspects of Brazilian culture.

5 units, Aut (Van den Dool) MTWThF
plus language lab

2. First-Year Portuguese (2nd Quarter) — Continuation of 1, following a proficiency-oriented approach with additional development of reading and writing skills. Literary and journalistic readings serve as a basis for discussions on a variety of Brazilian cultural aspects and current events. Prerequisite: 1 or consent of instructor.

5 units, Win (Van den Dool) MTWThF
plus language lab

3. First-Year Portuguese (3rd Quarter) — Continuation of 2. Emphasizes speaking and oral comprehension; further development of writing skills. Literary and journalistic materials increase reading comprehension proficiency and expand students' knowledge of Brazilian culture and current events. Prerequisite: 2 or consent of instructor.

5 units, Spr (Van den Dool) MTWThF
plus language lab

10. Elementary Conversation — Conversation practice as a supplement to 2, 2A, and 3. No study of grammar per se. Prerequisite: 1A, 2, or equivalent.

2 units, Win, Spr (Staff) TTh

11. Second-Year Portuguese (1st Quarter) — Development of oral comprehension, speaking, writing, and reading proficiency, with study of grammar aimed at furthering these skills. Cultural aspects approached through reading of short stories and journalistic material. Prerequisite: first-year sequence or consent of instructor.

5 units, Aut (Van den Dool) MTWThF

12. Second-Year Portuguese (2nd Quarter) — Continuation of 11, providing additional study of grammar to support the development of proficiency in oral comprehension, speaking, reading, and writing. Reading of complete plays and news articles provides material for examining cultural aspects and current events. Prerequisite: 11 or equivalent.

5 units, Win (Van den Dool) MTWThF

13. Second-Year Portuguese (3rd Quarter) — Focuses on the development of the four language skills; does not include the study of grammar per se. Preparation for literature courses and cultural issues. Full novels are read. Prerequisite: 12 or consent of instructor.

5 units, Spr (Van den Dool) MTWThF

15. Intermediate Conversation — Conversation practice recommended as a supplement to the second-year sequence. No study of grammar per se. Prerequisite: completion of first-year sequence or consent of instructor.

3 units, Aut, Win (Staff) MWF

99. Individual Work — For students wishing to engage in special projects. Cannot be taken as a substitute for any of the regularly scheduled language courses.
1-12 units, Aut, Win, Spr (Staff) by arrangement

100. Advanced Portuguese Conversation — Conversation practice recommended as a supplement to the second-year sequence. No study of grammar per se. May be counted only once for the major. Prerequisite: 12 or consent of instructor.

3 units, Spr (Staff) MWF

109P. Practicum for Speakers of Spanish — Accelerated course for beginners with superior knowledge of Spanish. Provides a fast-paced equivalent of Portuguese 1. Completion of 109P allows students to continue with the first-year sequence (2 and 3).

4 units, Aut, Spr (Van den Dool) TTh

109R. Reading Portuguese for Speakers of Spanish — For students with superior reading proficiency in Spanish. Concentrates on 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, Aut, Spr (Van den Dool) MWF

199. Individual Work — For students wishing to engage in special projects. Cannot be taken as a substitute for any of the regularly scheduled language courses. Prerequisite: completion of second-year sequence or consent of instructor.

1-12 units, Aut, Win, Spr (Staff) by arrangement

SPECIAL

1A. Accelerated First-Year Portuguese (1st Quarter) — Fast-paced equivalent to the first half of the regular first-year sequence; recommended for students with background in a Romance lan-
Follows a proficiency-oriented approach emphasizing speaking and oral comprehension. Introduction to aspects of Brazilian culture through class discussion and readings.

5 units, Win (Van den Dool) MTWThF plus language lab

2A. Accelerated First-Year Portuguese (2nd Quarter) — Continuation of 1A. Fast-paced equivalent to the second half of the regular first-year sequence; recommended for students with background in a Romance language. Emphasizes speaking and oral comprehension proficiency; attention to the development of writing skills. Literary and journalistic readings provide the basis for discussions on a variety of Brazilian cultural aspects and current events.

5 units, Spr (Van den Dool) MTWThF plus language lab

CULTURAL PERSPECTIVES

120. Portuguese Cultural Perspectives — Cultural survey from the formation of the nation to the present era, including physical and human geography, history of the language, expansion, “discoveries,” colonization and decolonization. Examination of modern democratic Portugal, literature and the arts, and international relations.

3-5 units, Aut (Carvalho)

130. Brazilian Cultural Perspectives — Discussions on diverse aspects of Brazilian culture. Focus varies depending on students’ interest. Prerequisite: completion of second-year sequence or consent of instructor.

3-5 units, Win (Van den Dool) MWF

184. Lusophone African Oral Literature — Introduction to traditional African cultures, examining African thought and African discourse on Mother Earth, the myths, family ties, habits, beliefs; the role of oral literature in traditional communities, concentrating on education, religious practices, philosophy, and leisure. The clash of cultures and influences in oral literature, and the role of oral tradition in modern written African literature. Texts from the literature of Angola, Mozambique, Guinea-Bissau, Cape Verde, San Tomé, Nigeria, and Dahomey.

3-5 units, Aut (de Carvalho)


3-5 units

ADVANCED UNDERGRADUATE AND GRADUATE LITERATURE

240. Brazilian Literature I: Origins to Independence — Principal literary movements of Brazilian literature from the 16th-19th centuries: “absence” of Brazilian cultures, chronicles of the Portuguese conquest and resistance, Colonial Baroque, Independence Movement, Romanticism, and Realism. The definition of genres and of Brazilian cultural identity within a dependent context.

3-5 units

241. Brazilian Literature II: Naturalism to the Present — Continuation of 240A, from the late 19th century, emphasizing narrative and poetry; modernism and postmodernism. Essays and autobiographical writings place the literary works in socio-historical perspective.

3-5 units

265. Tendencies in Contemporary Brazilian Literature — Traits and trends in Brazilian literature (universalism and modernism, the tradition of urban realism). Brazilian writers who exerted a permanent influence on different literary generations and are still considered a key source of inspiration and tendencies in contemporary Brazilian literature. In English or Portuguese

3-5 units, Win (Almino)

290. Brazilian Cinema — Introduction to major issues in the study of Brazilian film culture. The relationships of film, society, class, artistic production, and social change; the exploitation of women by male directors.

3-5 units

299. Individual Work — Open to graduates or undergraduates. May be repeated for credit.

1-12 units (Staff) by arrangement

GRADUATE SEMINARS

399. Individual Work — Exclusively for graduate students in Portuguese engaged in special work.

1-12 units, by arrangement

STATISTICS


Chair: Iain M. Johnstone


Associate Professors: Art B. Owen, Joseph P. Romano

Assistant Professors: Anindita Adhikari (on leave), Amir Dembo (on leave), Laura Lazzeroni, Jun Liu, Michael A. Martin (on leave), Guenter Walther

Courtesy Professors: Byron W. Brown (Biostatistics), Helena Kraemer, Richard A. Olshen
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), Health Research and Policy (Brown, Efron, Hastie, Johnstone, Moses, Olshen), Mathematics (Dembo), 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.

A candidate considering graduate work in statistics may be interested in the brochure “Careers in Statistics,” which is available upon request from the American Statistical Association, 1429 Duke St., Alexandria, VA 22314-3402.

The Department of Statistics is well equipped for statistical applications and research in computational statistics. Computer facilities include two DEC station 5000s networked to approximately 25 X-terminals, and a Macintosh IIfx 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.
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 sources 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 subspeciality in statistics to study for an M.S. degree instead. The unit requirement for an M.S. degree is 40-42 units, depending on the degree of difficulty of the courses, 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, 60, 61. These courses have no mathematical prerequisites. Statistics 40 and 60 are approved for the Mathematical Sciences distribution requirement for undergraduates. Statistics 40 covers discrete probability theory, game theory, decision theory, and applications to statistics. The sequence 60, 61, emphasizes mainly the techniques and methods of statistical inference.

Statistics 110, 116, 190, 200, 217-218 are introductory but have a calculus prerequisite. Statistics 110 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 one-year course in mathematical statistics; the sequence 116, 217, 218 is a basic one-year course in probability theory.

40. Chance and Strategy—(Graduate students register for 140.) Precalculus for nonmathematical students in probability theory and game theory. How statistical methods touch science, politics, engineering, health, and public policy. DR:4(6)

3 units, Aut (Owen) MWF 2:15

60. Introduction to Statistical Methods—(Graduate students register for 160.) A nonmathematical study of statistical methods. Emphasis is on statisti-
metrical 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. DR:4(6)

5 units, Aut (Lazzeroni) MTWThF 1:15
Win (Bloch) MTWThF 1:15
Spr (Lazzeroni) MTWThF 1:15
Sum (Staff) MTWThF 11

61. Introduction to Statistical Methods II — (Graduate students register for 161.) Chi-square tests, analysis of variance, regression, correlation, nonparametrics, sample surveys, elementary design of experiments. Prerequisite: 60 or consent of instructor.

5 units, Win (Lazzeroni) MWF 1:15

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. DR:4(6)

4 units, Aut (Switzer) MTWF 11
Sum (Staff) MTWThF 9


5 units, Aut (Walther) MTWThF 10
Spr (Wyner) MTWThF 10
Sum (Staff) MTWThF 2:15

140. Chance and Strategy — See 40. For graduate students.

3 units, Aut (Owen) MWF 2:15

152. Introduction to Operations Research I — (Enroll in Engineering 62.)

4 units, Aut (Hillier)
Spr (Staff)


4 units, Win (Glynn)

160. Introduction to Statistical Methods I — See 60. For graduate students.

5 units, Aut (Lazzeroni) MTWThF 1:15
Win (Bloch) MTWThF 1:15
Spr (Lazzeroni) MTWThF 1:15
Sum (Staff) MTWThF 11

161. Introduction to Statistical Methods II — See 61. For graduate students.

5 units, Win (Lazzeroni) MWF 1:15

190. Statistics 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. DR:4(6)

3-5 units, Aut (Wyner) MTWThF 1-2:15

199. Independent Study — For undergraduates. (Staff) by arrangement


3 units, Aut (Lai) MWF 1:15
Spr (Owen) MWF 11

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) MWF 3:15


3 units, Spr (Walther) MWF 3:15

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, not given 1994-95

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, not given 1994-95

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. Prerequisite: 200 or concurrent registration in 200.

3 units, Win (Switzer) MWF1

206. Applied Multivariate Analysis — Introduction to statistical analysis of several quantitative measurements on each observational unit. Emphasis 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, not given 1994-95

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, Win (Donoho) MWF 1:15

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, Aut (Efron) MWF 1:15

211. Statistical Methods for Meta-Analysis — (Same as Education 493B.) Meta-analysis is a quantitative method for combining results of independent studies. 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, not given 1994-95


3 units, Aut (Lai) MWF 2:15

Win (Romano) MWF 10

218. Introduction to Stochastic Processes — Renewal theory, point processes emphasizing the Poisson process. Also, Wiener and Gaussian processes and second-order processes. Prerequisite: 217.

3 units, Win (Cover) MWF 2:15

229. Selected Topics — Topics vary each year. Prerequisite: 200 or equivalent.

3 units, by arrangement


3 units, Spr (Hillier)

257. Simulation — (Enroll in Operations Research 253.)

3 units, Spr (Glynn)

PRIMARILY FOR DOCTORAL STUDENTS

Sequences 300A,B,C, 305, 306A,B, and 310A,B,C comprise the fundamental sequence which serves as a general introduction to and prerequisite for further work. Subsequent courses delve more deeply into special topics.

240. Linear Programming — (Enroll in Operations Research 241.)

3 units, Aut (Cottle)

260A,B,C. Workshop in Biostatistics — 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. 1-5 units, Aut (Brown, Efron, Hastie, Johnstone, Olshen) Th 1:15-3:05

260B. 1-5 units, Win (Brown, Efron, Hastie, Johnstone, Olshen) Th 1:15-3:05

260C. 1-5 units, Spr (Brown, Efron, Hastie, Johnstone, Olshen) Th 1:15-3:05
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 estimation; minimax 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 exponential 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. Other possible topics: sequential analysis, optimal experimental design, empirical processes with applications to statistics, Edgeworth expansions with applications to statistics.

300A. 3 units, Aut (Romano) MWF 10
300B. 3 units, Win (Romano) MWF 10
300C. 3 units, Spr (Romano) MWF 10

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 heteroscedasticity. Emphasis on problem sets involving substantial computations and realistic data. Prerequisites: 200, Computer Science 106A, Math. 113, or consent of instructor.

3 units, Aut (Hastie) MWF 1:15

306A,B. Methods for Applied Statistics — Survey of applied statistical methods, including computational methods. Topics: nonlinear least squares (including robust regression), generalized linear models, time series (autocorrelation, autoregression, periodogram, spectrum), survey sampling (finite populations, stratification, clustering, ratio estimation), nonparametric regression (kernels, splines, projection pursuit, CART, MARS), survival analysis (Kaplan-Meier, Mantel-Haenszel, Cox model), design (factorial experiments, response surfaces), random number generation, numerical linear algebra, numerical optimization, sample reuse (bootstrap, jackknife, cross-validation, other Monte Carlo), matrix based multivariate statistics (canonical correlation, T-squared, factor analysis, principal components), and other topics briefly. Prerequisite: 305 or equivalent.

306A. 3 units, Win (Donoho) MWF 1:15
306B. 3 units, Spr (Donoho) MWF 1:15


310A. 3 units, Aut (Lai) MWF 11
310B. 3 units, Win (Lai) MWF 11
310C. 3 units, Spr (Seigmund) MWF 11


3 units, not given 1994-95


317. 3 units, Spr (Olshen) MWF 3:15
319. Literature of Probability: Theory and Application — A literature study of topics in probability culminating in oral and written reports.
3 units, Aut (Owen) by arrangement
Win, Spr (Tibshirani) by arrangement

3 units, not given 1994-95

3 units, not given 1994-95

3 units, Aut (Olkin) MWF 3-4:15

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 1994-95

3 units, Spr (Friedman) MWF 2:15

328. Nonparametric Statistical Inference — Statistical inference without strong model assumptions; hypothesis testing and estimation using permutations and ranks; nonparametric model-fitting, tolerance limits, discriminant analysis, and analysis of variance.
3 units, not given 1994-95

3 units, Aut (Tibshirani) MWF 2:15

3 units, Win (Hastie) MWF 2:15

3 units, not given 1994-95
3 units, not given 1994-95

352. Spatial Statistics — Summary statistics, probability models, smoothing and interpolation, classification, sampling design, applications to remote sensing and environmental monitoring. 
3 units, not given 1994-95

3 units, not given 1994-95

358. Queueing Theory — (Enroll in Operations Research 358.) 
3 units, Spr (Inglehart) MW 2:15-3:30

3 units, Win (Glynn)

3 units, not given 1994-95

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 on drawing inferences via computer simulation. Mathematical analysis discussion. 
3 units, Win (Liu) MWF 11


375. Discrete Probabilistic Methods — Review of modern probabilistic methods suitable for analyzing discrete structures of the type naturally arising in computer science, number theory, information theory, and molecular sequence analysis. Topics: the basic probabilistic method and the linearity of expectation; the second moment and alterations; the local lemma, correlation, inequalities and their applications; Martingales, large deviations and the method of types; the Poisson paradigm, the Stein–Chen method and applications; branching processes and random graphs. Prerequisite: 116 or equivalent. 
3 units, not given 1994-95

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: Electrical Engineering 278 or Statistics 116, or equivalent. 
3 units, Win (Cover) TTh 2:45-4

3 units, Spr (Cover) TTh 11-12:15

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 (Friedman) by arrangement
Win (Friedman) by arrangement
Spr (Owen) by arrangement

399. Research — Research work as distinguished from independent study of nonresearch character listed in 199 and 299. 
(Staff) by arrangement
PROGRAM IN STRUCTURED LIBERAL EDUCATION

Emeritus: (Professor) John Goheen (Philosophy)
Director and Professor: Mark Mancall (History)
Lecturers: Edward Frueh, Suzanne Greenberg, Jonathan Reider, Mollie Schwartz Rosenhan, Greg Watkins
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 program, although a student can withdraw from the program at any time.

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 Cultures, Ideas, and Values Requirement DR:1, the Literature and Fine Arts Requirement DR:7(2), the Philosophical, Social, and Religious Thought Requirement DR:8(3), and the Writing Requirement.

91. 9 units, Aut (Staff) TWTh 3:15-5, TW 6:30-8 p.m., and Th 6-8 p.m.
92. 9 units, Win (Staff) TWTh 3:15-5, TW 6:30-8 p.m., and Th 6-8 p.m.
93. 9 units, Spr (Staff) TWTh 3:15-5, TW 6:30-8 p.m., and Th 6-8 p.m.

PROGRAM IN SYMBOLIC SYSTEMS

Director: Thomas Wasow (Linguistics and Philosophy)
Program Committee: Fred Dretske, James Greeno, Nils Nilsson, Brian Smith, Barbara Tversky, Thomas Wasow
Program Faculty: Joan Bresnan (Linguistics), Herbert H. Clark (Psychology), Fred Dretske (Philosophy), John Etchemendy (Philosophy), Solomon Feferman (Mathematics and Philosophy), John Gabrieli (Psychology), Peter Godfrey-Smith (Philosophy, on leave Spring), James Greeno (Education, on leave), David Heeger (Psychology), Martin Kay (Linguistics), Ellen Markman (Psychology), John McCarthy (Computer Science), Raymond McDermott (Education), Clifford Nass (Communication), Nils Nilsson (Computer Science), John Perry (Philosophy), Stanley Peters (Linguistics), Eric Roberts (Computer Science), David Rumelhart (Psychology), Ivan Sag (Linguistics, on leave), Peter Sells (Linguistics), Yoav Shoham (Computer Science), Barbara Tversky (Psychology), Decker Walker (Education), Brian Wandell (Psychology), Thomas Wasow (Linguistics and Philosophy), Terry Winograd (Computer Science)
Consulting Faculty: Philip Cohen, Joseph Y. Halpern (Computer Science), Per-Kristian Halvorsen (Linguistics), Jerry Hobbs (Linguistics), Bernardo Huberman (Applied Physics), David Israel (Philosophy), Ronald M. Kaplan (Linguistics), Lauri Karttunen (Linguistics), Kurt Konolige, C. Raymond Perrault (Philosophy), Stanley Rosenschein (Computer Science), Paul Skokowski (Philosophy), Brian Smith (Philosophy), Lucy Suchman, Annie Zaenen (Linguistics)

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? What would it take to build a computer that thinks, or that could understand and communicate in a human language?

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 post-graduate study in any of the contributing disciplines. It is also excellent preparation for employment immediately after graduation.

**UNDERGRADUATE PROGRAM**

**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 these and other departments.

Symbolic Systems majors 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:

2. Computation and Artificial Intelligence:
   a) Computer Science 106B, Programming Abstractions, or Computer Science 106X, Programming Methodology and Abstractions
   b) Computer Science 109A,B, Introduction to Computer Science
   c) Computer Science 221, Introduction to Artificial Intelligence
3. Philosophical Foundations:
   a) Philosophy 80, Mind, Matter, and Meaning
   b) Philosophy 181, Philosophy of Language or Philosophy 186, Philosophy of Mind
4. Language:
   a) Linguistics 120, Introduction to Syntax. (Students with a special interest in natural language may take, instead, Linguistics 220A, Introduction to Syntactic Theory, by consent of instructor.)
   b) Linguistics 130, Introduction to Semantics and Pragmatics or Linguistics 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 Computer Science 254, Automata, Languages, and Computability
6. Mathematics: one course on a mathematical topic other than calculus. Examples are suggested for different concentrations: Math. 109, 120, (Applied Logic); Computer Science 154, 154N, 254 (Human-Computer Interaction and Natural Language); Math. 130 (Neuroscience); Philosophy 160B, Math. 161 and 162 (Natural Language and Philosophical Foundations); Statistics 116 and 190 (Cognition, Education and Learning, Human-Computer Interaction, and Neuroscience).
7. Senior Seminar: Symbolic Systems 201

Students may select concentrations from the list below or design others in consultation with their advisers.

Applied Logic
Artificial Intelligence
Cognition
Computation
Education and Learning
Human-Computer Interaction
Natural Language
Neuroscience
Philosophical Foundations

**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 196.
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, at all levels, student research projects.

**COURSES**

**CORE**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Units</th>
<th>Quarter</th>
<th>Time</th>
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<tbody>
<tr>
<td>80</td>
<td>Mind, Matter, and Meaning — (Enroll in Philosophy 80.)</td>
<td>5</td>
<td>Aut</td>
<td>MWF 11</td>
</tr>
<tr>
<td>106</td>
<td>Introduction to Cognitive Psychology — (Enroll in Psychology 106.)</td>
<td>4</td>
<td>Win</td>
<td>(Bratman) TTh 1:15-2:30</td>
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<tr>
<td>106B</td>
<td>Programming Abstractions — (Enroll in Computer Science 106B.)</td>
<td>5</td>
<td>Win</td>
<td>(Feldman) MWF 11</td>
</tr>
<tr>
<td>106X</td>
<td>Programming Methodology and Abstractions (Accelerated) — (Enroll in Computer Science 106X.)</td>
<td>5</td>
<td>Win</td>
<td>(Zelenksi) MWF 2:15</td>
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<tbody>
<tr>
<td>109A</td>
<td>Introduction to Computer Science — (Enroll in Computer Science 109A,B.)</td>
<td>4</td>
<td>Win</td>
<td>(Johnson) MWF 3:15</td>
</tr>
<tr>
<td>109B</td>
<td>4 units, Win (Johnson) MWF 10</td>
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<td>Win</td>
<td>(Ullman) MWF 2:15</td>
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<tbody>
<tr>
<td>120</td>
<td>Introduction to Syntax — (Enroll in Linguistics 120.)</td>
<td>4</td>
<td>Win</td>
<td>(Wasow)</td>
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<tbody>
<tr>
<td>130</td>
<td>Introduction to Semantics and Pragmatics — (Enroll in Linguistics 130.)</td>
<td>4</td>
<td>Win</td>
<td>(Peters)</td>
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<tr>
<td>154</td>
<td>Introduction to Automata and Complexity Theory — (Enroll in Computer Science 154.)</td>
<td>4</td>
<td>Win</td>
<td>(Pratt) MWF 3:15-4:30</td>
</tr>
<tr>
<td>160A</td>
<td>First Order Logic— (Enroll in Philosophy 160A.)</td>
<td>4</td>
<td>Win</td>
<td>(Kremer) MWF 9</td>
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<tbody>
<tr>
<td>160B</td>
<td>Computability and Logic— (Enroll in Philosophy 160B.)</td>
<td>4</td>
<td>Spr</td>
<td>(Mints) MWF 9</td>
</tr>
<tr>
<td>181</td>
<td>Philosophy of Language — (Enroll in Philosophy 181.)</td>
<td>4</td>
<td>Spr</td>
<td>(Kremer) MW 2:15-3:30</td>
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<tr>
<td>184</td>
<td>Theory of Knowledge— (Enroll in Philosophy 184.)</td>
<td>4</td>
<td>Win</td>
<td>(Dretske) MWF 10</td>
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<tr>
<td>186</td>
<td>Philosophy of Mind — (Enroll in Philosophy 186.)</td>
<td>4</td>
<td>Aut</td>
<td>(Lazar) MWF 2:15</td>
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<tr>
<td>190</td>
<td>Senior Honors Tutorial — Under the supervision of the honors faculty adviser, students work on their senior honors project.</td>
<td>1-5</td>
<td>any</td>
<td>quarter</td>
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<tr>
<td>191</td>
<td>Senior Honors Seminar — Under the leadership of the Symbolic Systems program coordinator, students meet, discuss, and present their honors project.</td>
<td>2</td>
<td>Win, Spr</td>
<td>(Davies) by arrangement</td>
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<tr>
<td>196</td>
<td>Independent Study — Independent work under the supervision of a faculty member.</td>
<td>1-15</td>
<td>any</td>
<td>quarter (Staff)</td>
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**RESEARCH**

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<th>Time</th>
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| 190A        | Symbolic Systems Program Forum — Informal, introductory-level series aimed at exposing prospective and declared Symbolic Systems majors and other interested members of the Stanford community to the questions and phenomena addressed by symbolic systems related fields (cognitive psychology, artificial intelli-
gence, linguistics, philosophy of mind, neuroscience, etc.) and to the people currently doing research in these areas.

1 unit, Aut, Win, Spr (Staff) Th 4:15

20. Problems of Intelligence, Information, and Learning—(Same as Education 120.) Introduction to studies of intelligent reasoning, knowledge, understanding, representation, and meaning. Results of computational linguistics, philosophical, and psychological research discussed and compared. Relevance of the material to instruction and learning. DR:9(4)

4 units (Greeno) not given 1994-95

188. Cognition, Connectionism, and Neurobiology—Topics in the philosophy connectionism and neuroscience. Emphasis is on the explanatory value of these disciplines for students interested in mental representation, concept formation, and memory, and on recent work in complexity and emergence of cognitive systems.

3 units, Win (Skokowski) T 3:15-5:05

192B. Social Dilemmas—For sophomores only. Social dilemmas are insidious problems facing societies, whether social, economic, or organizational. They arise whenever intentional agents collaborate in the production of a common good. Topics: rational individual behavior and irrational collective outcomes. Free riders. The role of expectations. Analytical methods and computer experiments. The existence of a critical group size. Resolving social dilemmas.

3 units, Win (Huberman) by arrangement

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 as well as the further information of quarter and time given.

Communication

169. Communication, Technology, and Society—(Same as Science, Technology, and Society 162. Sociology 133.)
Spr (Nass)

Computer Science

201. Computers, Ethics, and Social Responsibility—(Same as Science, Technology, and Society 215.)
Spr (Roberts)

223A. Introduction to Robotics

Win (Khatib)

226. Expert System Application
Win (Barr, Tessler)

229. Machine Learning
Win (Nilsson)

258. Introduction to Programming Language Theory
Win (Mitchell)

273. Concepts of Text for Human-Computer Interaction—(Same as Art 281.)
Spr (Bigelow)

356B. Reasoning About Uncertainty
Win (Halpern)

377. Topics in Human-Computer Interaction
Aut (Strub)
Win, Spr (Staff)

Win (Winograd, Davis)

547. Human-Computer Interaction Seminar
Aut, Win, Spr (Winograd, Davis)

Education

224. Information Technology in the Classroom
Spr (Walker)

255. Human Abilities—(Same as Psychology 155.)
Win (Snow)

287X. Culture and Learning—(Same as Anthropology 136.)
Spr, Sum (McDermott, Baugh)

Linguistics

110. Introduction to Phonetics and Phonology
Spr (Staff)

207A. Morphology
Aut (Kiparsky)

207B. Morphosyntax
Win (Kiparsky)

221A. Head-Driven Phrase Structure Grammar I
Spr (Sag)

229. Seminar in Syntax: Inflectional and Derivation in Morphology
Win (Zwicky)

232. Topics in Discourse Analysis: Approaches to Narrative
Aut (Linde)

233. Semantics Seminar
Spr (Staff)
239A. Introduction to Computational Linguistics I/II
   Aut (E. Clark)
   Win (Kay)

240. Language Acquisition I — (Same as Psychology 240.)
   Aut (E. Clark)

241. Language Acquisition II: Meaning — (Same as Psychology 241.)

MATHEMATICS

161. Set Theory
   Spr (Rattier)

PHILOSOPHY

60. Introduction to the History and Philosophy of Science — (Same as History and Philosophy of Science 60.)
   Aut (Guttmann)

159. Basic Concepts in Mathematical Logic — (Same as Linguistics 135.)
   Aut (Wasow)

164. Central Topics in the Philosophy of Science
   Aut (Dupre)

168. Philosophy of Logic
   Win (Kremer)

169. Intensional Logic
   Spr (van Benthem)

187. Freud
   Spr (Lazar)

395A. Philosophy of Computation
   Win (Smith)

PSYCHOLOGY

70. Brain and Behavior
   Aut (R. Fernald, Wandell, Wine)

102. Perception
   Spr (Heeger)

141. Human Neuropsychology
   Spr (Gabrielli)

146. Language and Thought
   Aut (H. Clark)

162. Theoretical Methods in Cognitive Science and Cognitive Psychology
   Aut (Rumelhart)

200. Foundations of Cognitive Science
   Aut (Rumelhart)

206. Behavioral Neuroscience
   Spr (Wandell, Wine)

221. Applications of Vision Science
   Spr (Wandell)

266. Topics in Perception
   Aut, Win, Spr (Heeger)

267. Vision and Image Processing Laboratory
   Aut (Heeger)

PROGRAM ON URBAN STUDIES

Director: Leonard Ortolano (Professor of Civil Engineering)
The Committee on Urban Studies: (Chair) Paul Turner (Professor, Art); Albert Camarillo (Professor, History, on leave 1994-95), Paulla Ebron (Assistant Professor, Anthropology), 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), Milbrey McLaughlin (Professor, Education), Karen Sawislak (Assistant Professor, History), Paul Seaver (Professor, History), Nancy Tuma (Professor, Sociology), Paul Turner (Professor, Art)

Lecturers: Gerald Gast, Radford Hall, David Neuman, George Sipel, Michael Smiley, Frederic Stout, Patti Walters

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 degrees in business, law, or public policy.
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 may 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 advisor who is a member of the Academic Council.

In all cases, a minimum of 60 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 115.

Each of the following is required:
110. Introduction to Urban Studies
115. Utopia and Reality in Modern Urban Planning

Select at least one course from each of the following categories:

Urban Politics:
131. Urban Politics

Urban History:
144. Undergraduate Colloquium: The Historical Study of Cities
145. Introduction to Race and Ethnicity in the American Experience
147. Undergraduate Colloquium: Early Modern London — The Politics and Culture of Growth
149. Undergraduate Colloquium: Poverty and Homelessness

Urban Sociology:
150. Process and Practice of Community Service
155. The Urban Underclass

Urban Anthropology:
161. Language and Culture of Urban Youth
162. Urban Youth and Their Institutions: Research and Practice
164. The Multicultural City in Europe
166. Cultural Studies of the City

Urban Design and Architecture:
170. Introduction to Urban Design
171. Suburbia: New Downtowns of the 21st Century
174. Architectural Design Process

Urban and Environmental Planning:
180. Geological and Environmental Sciences I (required for students taking the urban planning option)
181. Environmental Planning Methods

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 majors take, at a minimum, Math. 19 and 20 during their freshman or sophomore year.

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 are considering the pursuit of a graduate degree in city planning should take Economics 51, Economic Analysis I.

REQUIRED TO COMPLETE THE MAJOR

Each of the following is required:

Courses in Organizations and Group Processes (15 units)
162. Communities and their Institutions: Research and Practice
Drama 113A. Group Communication

Select one from the following courses on organization theory

Soc. 160. Formal Organizations
or Soc. 163. Organizational Decision Making
or Indust. Engr. 100. Organizations: Theory and Management

Methods Sequence (7 or more units)
Anthro. 93. Pre-Field Research Seminar* and Anthro. 94. Post-Field Research Seminar or

Soc. 180A. Introduction to Sociological Research and Soc. 180B. Introduction to Sociological Research: Laboratory
Community Service Sequence (12 units)
134. Preparation for Internship Learning
150. Process and Practice of Community Service
194. Directed Individual Study in Community Organizations

* If the Methods Requirement is satisfied using Anthro. 93 and 94, then Anthro. 93 must be taken before completing Urban Studies 194. If the requirement is satisfied using Soc. 180A and B, then both courses should be taken before 194.
† Urban Studies 150 must be taken after (or simultaneously with) 194; Urban Studies 194 is only open to department majors and requires field work with a community organization and preparation of a detailed analysis of the organization and the community it serves. Information on the requirements for 194 is available in the Urban Studies Program office, Building 60, room 61B.
** Urban Studies 134 and 162 must be taken before 194.

RESTRICTED ELECTIVES
Students select courses from the following list to bring the total number of units taken to satisfy the major up to at least 70.
135. Policy Making and Problem Solving at the Local and Regional Level
149. Undergraduate Colloquium: Poverty and Homelessness
157. Education of Immigrants in Cities
158. Gay and Lesbian Urban Youth
161. Language and Culture of Urban Youth
164. The Multicultural City in Europe
166. Cultural Studies of the City
Ed. 141X. America's Children and Public Policy: Strategies for Change
Pol. Sci. 186K. American Education and Public Policy
Soc. 155. Children and Society

URBAN PLANNING OPTION
Courses required for the Urban Planning option introduce the techniques and approaches of city and regional planners. A course applying economics to the solution of urban problems is a key element of this option. Students are also required to study land use planning and the methods used to control the use of land. Because urban planners rely heavily on statistics and computers in doing their analyses, the major requires an introduction to each of these subjects. The Urban Planning option provides excellent preparation for graduate programs in urban and regional planning and in public policy analysis.

See department listings for course information.

PREREQUISITES
Course No. and Subject
Math. 41. Calculus
Econ. 1. Elementary Economics
Econ. 51. Economic Analysis I
Econ. 180. Mathematics for Economists

REQUIRED TO COMPLETE THE MAJOR
Course No. and Subject
Geol. and Envir. Sci. 131. Environmental Earth Sciences II
Geol. and Envir. Sci. 132. Environmental Earth Sciences III
Comp. Sci. 105A. Introduction to Computers
Stat. 190. Statistics for Social Scientists
Applied Microeconomics — select one of the following: Economics 148, 150, 154, 155.

RESTRICTED ELECTIVES
Any 100-level courses selected from the Urban Studies core, from any offered by the Program on Urban Studies, or from those listed below to bring the total to 60 units (not including prerequisites).
Civ. Engr. 172. Air Quality Management
Soc. 160. Formal Organizations
Soc. 163. Organizational Decision-Making
Soc. 165. Organizational Leadership

ARCHITECTURE AND URBAN DESIGN OPTION
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 skills 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 advised to take, in addition to the required courses, a year of calculus and introductory courses in physics.

See department listings for course information.

PRÉREQUISITES
Course No. and Subject
Art 40. Basic Drawing
Art 60. Basic Design

REQUIRED TO COMPLETE THE MAJOR
Course No. and Subject
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).

RESTRICTED ELECTIVES
Any 100-level courses selected from the Urban Studies core, any offered by the program on Urban Studies, any 100-level course offered by
the Department of Art in drawing, painting, sculpture, printmaking, or design, or from those listed below to bring the total to 60 units (not including Art 40 and 60).

Course No. and Subject
Civ. Engr. 176. Small Scale Energy Systems
Civ. Engr. 177. Building Energy Laboratory
Civ. Engr. 180B. Elementary Structural Analysis
Engr. 10. Applied Mechanics: Statics
Engr. 11. Mechanics of Materials

RECOMMENDED ADDITIONAL STUDY

Architecture 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 master’s degree programs. In addition, many graduate schools of architecture require calculus and physics as conditions for admission. Potential applicants to architecture schools are strongly advised to take Math. 19, 20, and 21, and Physics 21.

Students seeking exposure to orthographic projection, sectioning, and other aspects of technical drawing should take Drama 33, Drafting for the Theater, or 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 and review catalogues of 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 60 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 or urban public policy. It 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 focusing on an area other than Community Organization, Urban Planning, or Architecture and Urban Design should include a course list and a description of how the courses meet the student’s educational objectives. Proposals must be submitted for approval by the Urban Studies Committee by the end of the second quarter of the student’s junior year. Applications received after that deadline are not considered. The program director will assist students in designing their own option.

HONORS PROGRAM

The honors program offers qualified students an opportunity to conduct independent research and to write a thesis of superior quality 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 letter grade indicator (LGI) in their major, and successfully completed all the course requirements for their major. 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. Students may obtain details regarding application, admission, and honors procedures from the office of the Program on Urban Studies.

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 are available prior to each quarter from the program offices and are listed in each quarter’s Time Schedule.

10. Dialogues Tutorials: Urban Growth Control Analysis — Critical readings, study, and analysis of the philosophy, techniques, and conflicts of urban growth control, emphasizing growth control measures in California. Readings relate to the issues and conflicts surrounding urban growth control, sample local growth control measures, and controversies regarding statewide growth control activities and legislation. Students report on their analysis.

1 unit, Aut (Hall) F 10:15-11:05

41. Introductory Seminar: The Society of Renaissance Florence — (Enroll in History 16S.) Takes the beginning student into the historian’s workshop and provides first-hand experience in interpreting documents, constructing a coherent story from them, and in discovering why it is possible to agree on the
factors but not to agree on what they mean. Florentine
documents of the Renaissance, from census records
to court records, letters, and diaries are analyzed
with the help of computers. Students develop their
own interpretations of what Florentines were like.
Emphasis is on social structure and everyday people.
5 units, Spr (Fraga) Th 1:15-3:05

50. Current Trends in Policy Making — (Enroll in
Public Policy 50.) Urban Studies students enroll in
the Urban Studies section. Guest speakers address
current policy issues (the environment, health care,
education, and the budget). Discussions about these
policies, stressing interactive learning that puts stu-
dents in the positions of the policy makers.
3 units, Spr (Brady, Cogan, Noll)

110. Introduction to Urban Studies — Interdisci-
plinary 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, polit-
ics, architecture, urban design, and urban public
policy formation).
4 units, Aut (Stout) MW 9:30-10:50

115. Seminar: Utopia and Reality in Modern
Urban Planning — (Enroll in Art 280.) Primarily
for upper-level undergraduate Urban Studies ma-
jors. Examines utopian urbanist thinkers (Ebenezer
Howard, Le Corbusier, Frank Lloyd Wright, and
others) who have established the conceptual ground-
work of contemporary urban planning practice.
Student participation and research-oriented term
paper required.
4 units, Win (Stout, Turner) W 1:15-3:05

120. Urban Economics — (Enroll in Economics
148.) The economics of urban areas. Land use,
urban transportation, housing and local taxation,
and provision of local public services. The econom-
ics of urban problems: poverty, crime, and
homelessness. Use of economic theory and basic
statistical techniques to understand these issues.
Class project. Prerequisites: Economics 51, 80.
5 units, Win (Staff)

131. Urban Politics — (Enroll in Political Science
186.) Introduces the major actors, institutions, pro-
cesses, and policies of sub-state government in the
U.S. Focuses primarily on city general-purpose
governments through a comparative examination of
historical and contemporary politics. Issues are re-
lated to federalism, representation, voting, race,
poverty, housing, and finances. Prerequisite for
Urban Studies majors: 110.
5 units, Win (Fraga)

132. Seminar: Urban Politics and Policy — (En-
roll in Political Science 291F.) Graduate/under-
graduate seminar examines the major theoretical
approaches used in the analysis of urban politics and
policy. Fundamental conclusions about American
politics reached by urban scholars are assessed as to
how subsequent interpretations set the context for
scholarly debate and understanding about Ameri-
can political development generally.
5 units (Fraga) not given 1994-95

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 develop-
ment deals with values, votes, revenues, conflicts,
deals, mistrusts, negotiations, and compromise. Why
are developers, environmentalists, and cities an-
tagons? What effect does this have on cities and
the Bay Area in general? One required Saturday
morning field trip. Prerequisite for Urban Studies
majors: 110.
4 units, Win (Sipel) W 7-9:30 p.m.

134. Preparation for Internship Learning — (En-
roll in Public Policy 179.) Provides students with
the knowledge and skills necessary for effective
learning through an internship. Focus is on identify-
ning and negotiating internship assignments which
yield effective service and substantive learning ap-
propriate to students’ academic interests. Introduc-
tion to the theory and practice of self-directed “field”
learning (e.g., clarifying goals and objectives, criti-
cal reflection on experience, problem solving, as-
sessing experiential learning, understanding the in-
terplay between experience and analysis in field
research). If appropriate, students are placed with
faculty who serve as sponsors of internship-related
directed study.
3 units, Win (Luce) MW 3:45-5

135. Policy Making and Problem-Solving at the
Local and Regional Level — (Enroll in Public Policy
182.) Public policy issues, processes, and organiza-
tions at the local and regional level. Focus: public
and non-profit sector institutions and organiza-
tions; structure and context of community problem-
solving and local policy formulation, implementa-
tion and analysis. Case study investigation of public
issues in the community, e.g., homelessness, toxic
waste disposal, child care, land use planning. Op-
portunity to learn from local policy makers and
community leaders.
4 units, Spr (Stanton) TTh 3:15-5:05

136. Politics and Public Policy — (Enroll in Polit-
ical Science 101P, Public Policy 101.) The domestic
policy-making process, emphasizing how elected
officials, bureaucrats, and interest groups shape
government policies in various areas (tax, environ-
mental, and social-welfare), given their goals and
available tactics. How public policies are formu-
lated and implemented. Results of this process us-
ing equity and efficiency criteria. Prerequisite: Po-
itical Science 1 or 10.
5 units, Spr (Brady)
137. Seminar: Politics of Race and Ethnicity in the United States—(Enroll in Political Science 192F.) Examines the historical and contemporary politics of selected communities or color to comprehensively understand American political development and many of 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 is required.

5 units, Win (Fraga)

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 (Sipel) given 1995-96


3 units, Aut (Kirst, Tyack) MW 2:15
and by arrangement

144. Undergraduate Colloquium: The Historical Study of Cities—(Enroll in History 266.) 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, Aut (Sawislak) T 1:15-3:05

145. Introduction to Race and Ethnicity in the American Experience—(Enroll in American Studies 164, Chicano Studies 164, History 164.) How factors of 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. DR:3

5 units, Spr (Fredrickson, Gutierrez)

147. Undergraduate Colloquium: Early Modern London: The Politics and Culture of Growth—(Enroll in History 240.) Between 1500 and 1700 London grew from a late medieval town of 50-60,000 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 the 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, Win (Seaver) T 1:15-3:05

149. Undergraduate Colloquium: Poverty and Homelessness—(Enroll in History 251A.) 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 readings/discussions. Must interview with the instructor before enrolling.

5 units, Win (Staff)

150. The Process and Practice of Community Service—(Enroll in American Studies 120.) 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)

155. The Urban Underclass—(Enroll in Sociology 149/249.) Analysis of recent research and theory of 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.

5 units, Spr (Ozak) TTh 11
section by arrangement

156. The State of Public Education in Urban Communities—(Enroll in Education 100X.) Introduction to the current issues and problems in public education in urban communities. Guest presentations by faculty and community members. Community service placement as a tutor or classroom aid is required.

3 units, Aut, Win (Takemoto) W 4:15-5:45

157. Education of Immigrants in Cities—The historical and contemporary approaches to educating immigrant students. The demands placed on schools, vocational training centers, adult education centers, and institutions of higher education by immigrants. Case study approach focuses on urban centers to demonstrate how stressed urban educa-
tional agencies serve both immigrants and native-born U.S. students when confronted with overcrowded classrooms, controversy over curriculum, the current school reform movement, and government policies regarding equal educational opportunity.

4 units (Padilla) given 1995-96

158. Gay and Lesbian Urban Youth — Focuses on gay and lesbian youth from the view of developmental psychology, educational practice, and urban studies. As an invisible, disempowered minority, gay and lesbian youth are overrepresented in social problems that affect inner city youth (violence, homelessness, HIV/STDs, prostitution, substance abuse, sexual abuse, and suicide). The impact of societal homophobia on identity development, family relations, social support, educational practice, and the delivery of youth services in urban settings.

3 units (Diaz) given 1995-96

161. Language and Culture among Urban Youth — (Enroll in Anthropology 170A, Linguistics 159.) Sociocultural and linguistic studies through which urban youth have been defined and debated. Gang histories and structures, ghetto and project life, socialization of children and youth, and aesthetic expression (graffiti, vernaculars, music, drama, and pictorial art.) Case study with investigations of language and culture patterns within institutions (e.g., families, schools, youth groups, (including Boys’ and Girls’ Clubs, neighborhood basketball leagues, etc.), and “service” agencies. Emphasis on U.S. youth, with comparative perspectives from other nations, especially with respect to language socialization.

5 units, Win (Heath)

162. Urban Youth and Their Institutions: Research and Practice — (Enroll in Education 110X.) 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. (APA)

5 units, Aut (Heath, McLaughlin)
MW 1:15–3:05

164. The Multicultural City in Europe — (Enroll in Anthropology 159A.) 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 peoples’ 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) MW 1:15–3:05

166. Cultural Studies of the City — (Same as English 163B.) The way individuals and groups represent themselves to themselves and thereby construct their identities in urban environments, or how the modern city looks from different perspectives. Materials span the industrial city of 19th-century Britain to the post-industrial or postmodern city of late 20th-century U.S. Topics: economic position, race, ethnicity, gender, work, leisure, space, property, security, danger, access to technology, and other components of urban identities. Genres: imaginative literature and social theory.

5 units, Win (Gagnier) TWTh 11

170. Introduction to Urban Design — (Same as Art 168A.) 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 field workshops in San Francisco.

5 units, Win (Gast) Th 9-10:50 and 7-9 p.m. plus two Sat. workshops

171. Suburbia: New Downtowns of the 21st Century — Evolution of the American suburb, emphasizing the post WWII 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.

3 units, Aut (Smiley) T 7-9 p.m.

174. Architectural Design Process — For Urban Studies majors, or by consent of instructor. Lecture/studio. Introduction to the basics of facility development through building design case studies, including studio sessions. Visits and discussion with practicing architects/landscape architects. Student work is prepared as an architectural program state-
175. Innovative Architecture: Provoking Change — Architectural lecture series comprised of four speakers organized by David Neumann, University Architect. Introduction to their work and its broader historical context. Methods of architectural evaluation and introductory design exercises. Enrollment limited to 16.

4 units, Spr (Neuman) MW 4-6

178. Ethics and the Built Environment — (Enroll in Science, Technology, and Society 210.) Seminar on ethical and values issues raised by the constitution and transformation of the built/human-made environments in the contemporary U.S. Analysis of built-environment-related ethical issues that confront architects, city planners, civil engineers, and ordinary citizens. Ethical issues raised by material structures (tall buildings, highways, houses), traffic (vehicles, pedestrians, tourists), “signage” (billboards, shopsigns, graffiti), the “soundscape” (technological noise, natural sounds), and public social spaces (streets, plazas, malls, playgrounds). Limited enrollment.

3-4 units (McGinn) given 1995-96

180. Environmental Earth Sciences I — (Enroll in Geological and Environmental Sciences 130.) First of a three-course sequence on the relationship of environmental earth sciences to land use planning. Major 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 project area and present results to class. DR:6(8)

4 units, Aut (Mader, Remson) MWF 11 labs, seminars, and field trips by arrangement

181. Environmental Planning Methods — (Enroll in Civil Engineering 171.) For juniors and seniors. Use of microeconomics and mathematical optimization theory in design of environmental regulatory programs; tradeoff between equity and efficiency in designing regulations; techniques for predicting visual, noise, and traffic impacts in environmental impact assessments; introduction to risk assessment and geographic information systems. Prerequisites: 170, Math. 43. Recommended: Economics 1, 51.

3 units, Win (Ortolano) MW 3:15-4:30

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 (Hall) TTh 9-10:30

190. Urban Design and Planning Seminar — Seminar on the contemporary practice of urban design and planning, and related fields. Bay Area professionals lecture and respond to questions concerning the nature of their day-to-day work, impressions of the field in general, and academic background recommended for that career. One session devoted to graduate schools and degrees relevant to these fields.

1 unit, Spr (Staff)


2-4 units (Ortolano) by arrangement

193. Special Projects

2-5 units (Staff) by arrangement

194. Directed Individual Study in Community Organizations — For Urban Studies majors only. Field work with a community organization and preparation of a detailed analysis of the organization and the community it serves. See Urban Studies program, Building 60, room 61B. Prerequisites: 134 and Anthropology 93, or Sociology 180A and B. 5 units (Staff) by arrangement

197. Directed Reading

2-5 units (Staff) by arrangement

199. Honors Thesis

1-10 units (Staff) by arrangement
The Sophomore Dialogues and Seminars Program provides opportunities for second-year students to work closely with faculty as they explore their potential or recently-declared major course of study. Designed with sophomores in mind, the courses aim to personalize students' education and foster a spirit of mentorship between faculty and students. The courses are given department credit and most count towards an eventual major in the field. None qualify for Distribution Requirements.

Peters Seminars are taught for eight to ten students in a seminar format. Dialogues Tutorials take the form of group directed reading for two to four students. Because space is limited, students may enroll in only one of these courses each quarter.

All Dialogues Tutorials and many Peters Seminars require a brief application. Check the Time Schedule or with the Dialogues and Seminars office (123 Sweet Hall, phone 415-723-4504) to find out if an application is required for the course you wish to take. Due dates for applications for the 1994-1995 courses are: Autumn Quarter, 10 a.m., September 28; Winter Quarter, 5 p.m., December 16; Spring Quarter, 5 p.m., March 24.

### COURSES

#### PETERS SEMINARS

##### ANTHROPOLOGY

**98A. Maya Mythology Multimedia Project**  
5 units, Aut (Fox)

##### CHEMISTRY

**100L. Laser Methods in Chemistry**  
3 units, Aut (Zare) T2-5

##### DRAMA

**180A. Performance and Society: How Societies Use Performance in Defining Their Identity**  
3-4 units, Win (Weber) W3:15-6:05

**180B. Noam Chomsky: The Drama of Resistance**  
4 units, Spr (Rehm) W2:15-5:05

##### ECONOMICS

**99. State, Market, and Development**  
5 units, Win (Meier)

##### ENGLISH

**198M. Researching Indian America**  
3 units, Aut (Warrior)

**198N. Five Masterpieces of Modern American Literature**  
3 units, Aut (Bacon)

##### HISTORY

**204C. Jews and Muslims**  
5 units, Spr (Rodrigue) W1:15-3:05

**204D. Approaching Islam: History and Western Representations**  
5 units, Win (Beinin) T1:15-3:05

##### HUMAN BIOLOGY

**96B. Contemporary Issues in Human Experimentation**  
3 units, Win (Constantinou)

**96F. The Human Hand: Evolution, Development, and Molecular Genetics**  
4 units, Win (Porzig)
96G. Multidisciplinary Perspectives on Guilt
3 units, Spr (Katchadourian)

96H. Harassment and Discrimination
3 units, Aut (Shuer)

LATIN AMERICAN STUDIES
87. Urbanization, Poverty, and Children in Latin America
5 units, Spr (Morrison)

MUSIC
15A. Topics in Interactive Computer-Music Performance
4 units, Spr (Chafe)

POLITICAL SCIENCE
99B. Evolution of Sovereignty
3-5 units, Win (Krasner)

99D. Dialogue on European Integration
3-5 units, (Schmitter)

PSYCHOLOGY
181B. Dynamics of Time Perspective
3-4 units, Spr (Zimbardo) MW 1:15-3:05

181C. Studies of Animal Behavior—(Same as Human Biology 96E.)
3 units, Win (R. Fernald) W 3:15-5:30

181E. Biology and Culture in Language Development—(Same as Human Biology 96L.)
3 units, Spr (A. Fernald) Th 3:15-5:30

SCIENCE, TECHNOLOGY, AND SOCIETY
114. Environmental Ethics
3-4 units, Aut (McGinn) M 3:15-5:05

114A. Classical Professionalism
3-4 units, Win (Meehan) Th 8:30-10:50

114B. Human Artifacts: Things and Their Makers
3 units, Spr (Katz) F 1:15-3:05

SOCIOLOGY
50. Teams and Teamwork
5 units, Win (Cohen)

51. Social Demography and Health
4 units, Spr (Herting)

SPANISH AND PORTUGUESE
190A. Peter’s Seminar: Don Quixote
3-5 units, Win (Martín)

190C. Mexico in Arms: From the Mexican Revolution (1910) to Chiapas (1994)
3-5 units, Aut (Ruffinelli)

SYMBOLIC SYSTEMS
192. Social Dilemmas
2 units, Win (Huberman) by arrangement

DIALOGUE TUTORIALS
ENGLISH
198B. Nabokov’s Postmodern Masterpieces
2 units, Aut (Holeton)

GERMAN STUDIES
78A. The Germans: Who Are They?
2 units, Win, Spr (Petig)

HUMAN BIOLOGY
97A. Approaches to Understanding the Life Course
1-2 units, Aut (Hastorf)

HUMANITIES SPECIAL PROGRAMS
120. Literature and its Readers
2 units, Win (Brooks)

POLITICAL SCIENCE
98. Promises and Moral Obligation
2 units, Spr (Tunick)

99C. Politics Through the Lens of the Contemporary Novel
5 units, Spr (Hansot)

SLAVIC LANGUAGES AND LITERATURES
198A. Yugoslav Cinematography
2 units, Aut (Bojic) by arrangement

URBAN STUDIES
10. Urban Growth Control Analysis
1 unit, Aut (Hall) F 10:15-11:05

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.

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.
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 Folio, the computer processor which includes Socrates, the on-line library catalog. 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. The deadlines for major grants (up to $2,500) for 1994-95 are Friday, April 7 for projects in social sciences, natural sciences, and engineering and Friday, April 21 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 28, February 10, and April 21.

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, December 2, 1994. 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.

The newest URO opportunities benefit students from targeted ethnic minority groups. The Mellon Minority Undergraduate Fellowship program is for students in the humanities, mathematics, or physics and encourages 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 16, 1995.

Ford Assistantship Awards provide funding for an introduction to the research environment by assisting a faculty member with his or her own research. Ford Research Awards offer term-time earnings replacement so that students can do independent research. Applications are reviewed on a rolling basis.
STANFORD IN WASHINGTON

Director: Adrienne Jamison

Stanford in Washington enables highly-qualified undergraduates to work and study in the nation’s capital. In addition to providing students with an understanding of public policymaking and encouraging them to consider careers in public service, 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). Students usually write a major paper related to their internship for 3-5 units of credit.

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, 415-723-0992.

COURSES

Towards a New American Foreign Policy — The containment of the Soviet threat, 1945-1991, the fall of the Soviet Union, our allies in the western alliance, and the global context of post-containment looking at the security situation, economic challenges, and political constellation. Speculative scenarios for American foreign policy in the new era.

5 units, Aut (Dorfman) T 4-6, 7:30-8:30 p.m.

Law and Economics — (Enroll in Economics 159.)

5 units, Aut (Owen) M 4-6, 7:30-8:30 p.m.

Environmental Economics and Policy — Analysis of environmental problems and solutions from an economic perspective. Focus is on models of environmental problems and applying economic tools to policy issues.

5 units, Win (Bulow) T 4-6, 7:30-8:30 p.m.

198. Tutorial — Individual and small-group discussions conducted by tutors. Possible topics: health policy, environmental policy, economic policy, civil rights, education policy, gender equality, foreign policy, arts policy, child and family policy and law.

5 units, Aut, Spr (Staff) by arrangement

WRITING ACROSS THE CURRICULUM

The Writing Across the Curriculum (WAC) Program supports faculty in the School of Humanities and Sciences in their efforts to improve students’ writing in courses beyond the Freshman Writing Requirement. The goal of Writing Across the Curriculum is for students to learn discipline-based writing skills by taking a required writing-focus course in their major.

Writing-focus courses incorporate writing instruction appropriate to the topic and level of study. They differ from department to department, and have no set format or minimum number of writing assignments. All writing-focus courses, however, provide help to students as they progress with their writing. There is no limit to the number of writing-focus courses a student may take.

Writing-focus instructors are distinguished by a commitment to improving undergraduate writing in their respective fields. In support of this commitment, WAC provides the instructor and teaching assistants in each writing-focus course with the services of an experienced writing consultant, who advises them on the design of assignments and the critiquing of student work. Therefore, students in writing-focus courses benefit from the unique opportunity of having teachers with expertise not only in the subject matter of the course, but also in writing pedagogy.

Departments offering Writing Across the Curriculum courses for 1994-95 include: Anthropology, Art, Biology, Classics, Drama, Economics, History, Human Biology, Linguistics, Music, Philosophy, Physics, Psychology, Public Policy, and Science, Technology, and Society (STS).

Dean: Paul A. Brest
Associate Deans: Susan S. Bell, Frank Brucato
Assistant Dean: Karen Biestman
Academic Curriculum Officers: Mark G. Kelman, Robert Weisberg


Associate Professors: Janet E. Halley (on leave Spring), Bill Ong Hing, Linda Mabry, Kim A. Taylor-Donohue, Deborah M. Weiss

Assistant Professor: Richard Thompson Ford
Professor (Teaching): William C. Lazier


Acting Associate Professor: Linda Krieger
Consulting Professors: Allen W. Kleidon, Victor Hao Li, William E. Wecker
Visiting Professors: Raymond D. Austin, Thomas Erlich, William N. Eskridge, Jr., Gerald F. Uelman, Roman Weil
Visiting Assistant Professors: Ann Alpers, Ian Haney Lopez

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 8, 1994. Spring term classes begin on January 17, 1995, and the term ends on May 24, 1995.

COURSES

GRADUATE

The following courses are open to qualified graduate students of 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. Focuses on 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 on scientific method and its relevance to legal analysis.

3 term units (Rosenhan) not given 1994-95

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) including: the protection of art of works 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; art napping and insurance; legal problems of art museums, etc.

3 term units, Spr semester (Merryman, Elsen) M 7:30-10 p.m.

325. Interdisciplinary Seminar on Conflict Resolution — (Same as Economics 386, Operations Research 366, Psychology 283.) Addresses problems of conflict resolution and negotiation from an interdisciplinary perspective. Presentations by faculty and scholars from other universities.

2 term units, Win (Alexander, Arrow, Ross, Tversky, Wilson) T 4:10-5:30

327. Jury Decision-Making — (Same as Psychology 355.) Limited to Law and graduate students who have consent of instructor. Seminar examines the psychological processes regulating jury decision-making. The cognitive aspects of a presentation (the amount of information that can be retained and processed), story, and construal processes. The social psychological aspects of group decision-making. Preparation for trial, including trial simulation, voir dire, and juror selection.

3 term units (Rosenhan) not given 1994-95

329. Psychopathology and Mental Health Law — The literature on severe psychopathology focusing on diagnosis, nature, and effects of treatment, predictions of dangerousness to self and others, and assessment of grave disability and competence. Effects of diagnostic stereotyping, current modes of treatment, and our technical ability to predict social behavior are assessed for their legal implications. Law and practice in commitment and conservatorship, issues and case law in right to treatment, patients’ rights, informed consent, assessment of malpractice, and psychosurgery.

3 term units (Rosenhan) not given 1994-95

345. Psychology and Law Proseminar — (Same as Psychology 225.) 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, Aut (Rosenhan) T 12:45-3 Th 1:45-3


3 term units (Rhode) not given 1994-95

381. Health Law and Policy — (Same as Health Research and Policy 210.) Introduces some of the legal, policy, and ethical issues spawned by the health industries. Focuses on: quality assurance through malpractice litigation, peer review, etc.; health care financing through Medicare, Medicaid, private insurance, and health maintenance organizations; and bioethical issues (the definition of death and the “right-to-die”). Non-law students admitted by the consent of instructor.

3 term units, Spr semester (Greely) M 1-3:10 T 1-2

464. Advanced Issues in Health Law and Policy — (Same as Health Research and Policy 211.) Current issues in health law and policy. Conflicts of interest in medicine including financial conflicts between doctors, patients, and insurers or government financing bodies; ethical conflicts between doctors, patients, and society; and wide-ranging conflicts between medical researchers and patients. Develops an integrated view of the appropriate role for law in limiting a health provider’s discretion. Explores issues of interest through student-guided presentations. Enrollment limited to 18. Prerequisite: 381 or Health Research and Policy 391 or equivalent. Non-law student prerequisite: consent of the instructor.

3 term units (Greely) not given 1994-95

604. 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.

3 term units, Spr (Barton, Botstein, Breely) TW 8:35-9:50

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. DR:9(5)

5 units, Aut (Friedman)
SCHOOL OF MEDICINE

Vice President for Medical Affairs and Dean: David Korn
Senior Associate Dean for Education and Student Affairs: Charlotte D. Jacobs

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. Except for the Departments of Biochemistry and Cell Biology, applications and information for all graduate programs may be obtained from Graduate Admissions, Registrar's Office, Stanford University, Stanford, California 94305-3005.

The Combined Admissions Mode program (CAM) allows a select group of students to enter graduate study in the biomedical and biological sciences without committing to a particular department or program. See below for details on CAM.

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, ambulatory care, 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 catalog School of Medicine. For application materials write: Committee on Admissions, Stanford University, School of Medicine, 851 Welch Road, Room 154, Palo Alto, CA 94304-1677.
COMBINED ADMISSIONS MODE (CAM) IN BIOLOGICAL AND BIOMEDICAL SCIENCES

Co-Directors: Ron Kopito (Associate Professor of Biological Sciences), W. James Nelson (Associate Professor of Molecular and Cellular Physiology)

Committee for Combined Admissions Mode (CAM): Helen Blau (Professor of Pharmacology), John Boothroyd (Associate Professor of Microbiology and Immunology), Martin Brown (Professor of Radiation Oncology, Director of Cancer Biology Program), Michele Calos (Associate Professor of Genetics), David Clayton (Professor of Developmental Biology, Director of Medical Scientist Training Program), Dan Herschlag (Assistant Professor of Biochemistry), Patricia Jones (Professor of Biology, Director of Program in Immunology), David McKay (Professor of Cell Biology), Mark Musen (Assistant Professor of Medicine, Medical Information Sciences Program), Howard Schulman (Professor of Neurobiology, Director, Neurosciences Program), Thomas Schwarz (Assistant Professor of Molecular and Cellular Physiology)

GRADUATE PROGRAM

Through CAM, a number of new students in the biological and biomedical sciences are given between six and nine months to experience different areas of research before choosing a specific program or department in which to complete the Ph.D. All Ph.D.-granting departments and programs in the School of Medicine participate in CAM including the Departments of Biochemistry, Cell Biology, Developmental Biology, Genetics, Microbiology and Immunology, Molecular and Cellular Physiology, and Molecular Pharmacology, as well as interdepartmental programs in Biophysics, Cancer Biology, Immunology, Medical Information Sciences, and Neurosciences. Additionally, faculty with relevant interests in the Departments of Biological Sciences and Chemistry may also serve as preceptors for CAM students. The opportunities available to CAM students, therefore, span virtually all areas of modern research in the life sciences. CAM is not a Ph.D.-granting program, as such. Rather, it serves as an entryway into the fourteen programs listed above. It is designed to enable students to experience a small slice of research activities at Stanford and then to choose from the myriad opportunities. Students are able to complete their degrees in the same time as students who enter a given Ph.D. program directly.

CAM applicants should have an undergraduate training in the biological or related sciences. Information may be obtained through Graduate Admissions in the University's Registrar's Office. Application is made on the standard form used by all Ph.D. programs in the School of Medicine. Application review is by the CAM committee, which uses the usual criteria for assessing excellence and potential of students for productive careers in science. Such criteria include undergraduate academic records, letters of recommendation, previous research experience, commitment to biomedical research, and GRE scores (including the subject test in either biology, molecular biology, or chemistry) which should be taken in October of the application year, at the latest, for the results to be received by the application deadline. See the Stanford University Guide to Graduate Admission for additional details.

Once admitted to the program, students are asked to identify, in order of preference, three labs in which they would like to spend the first quarter of research. The CAM committee examines the responses and labs are assigned according to each student's preference. Laboratory faculty members are assigned as the student's first-quarter adviser.

At the beginning of Autumn Quarter, each student meets with the assigned adviser, the CAM director (who provides information to all students on all departmental program requirements), and a third faculty member chosen by the CAM committee as an additional adviser. Through these meetings, a short research project is initiated and appropriate courses identified for the first year. The courses chosen are based on each student's likely area of specialization, which should ensure that CAM students are on a level with other students when they formally enter a Ph.D.-granting program.

At the end of Autumn Quarter, and after discussions with their advisers, students select a lab for Winter Quarter. Each student makes her or his own arrangements with the chosen faculty member, but continues non-lab coursework.

By Spring Quarter, students should have identified the appropriate Ph.D. program and lab in which they will do their thesis work. As in all Ph.D. programs, acceptance into a lab is ultimately the decision of the principal faculty member and is subject to the availability of space and funds. In some cases, the faculty member may wish to consult with colleagues before accepting a student, but no formal re-review of a student's credentials is made. The requirements for completion of the Ph.D. may vary between programs but,
in all cases, there is a strong emphasis on successful completion of research constituting an original and significant contribution to the field.

CAM students are supported by the CAM program for the first year. Subject to satisfactory student progress, support covers tuition and a living stipend based on the median level for all participating programs. Support in subsequent years is provided by the faculty member or program in which the student pursues the Ph.D. CAM applicants are strongly urged to make early application for outside awards such as those available from the National Science Foundation and Howard Hughes Medical Institute, both of which have November 1994 application deadlines.

Entry to the CAM program is likely to be highly competitive as only about ten to fifteen students are admitted each year. CAM represents a unique opportunity to choose from and to experience the diversity of research at Stanford, with the ultimate goal of pursuing the Ph.D. degree in a department or program.

COURSES

Developmental Biology 216 is required of all first-year CAM students. Other courses are selected based on student's likely area of specialization.

200. Problems and Approaches in Biological Research — (Enroll in Developmental Biology 216.) Acquaints students with the common set of methods and logic used to study diverse problems in biology. Each week, students read a paper from the primary research literature and critically discuss the paper with faculty from the different research departments at Stanford. Discussions emphasize the relevance of the paper to broader issues in the field, the strengths and weaknesses of the methods and approach used, the role of other techniques or organisms in providing complementary information, and possible directions for future work in related areas.

1 unit, Aut (Kim, Kingsley)

BIOCHEMISTRY

Emeritus: (Professor) Arthur Kornberg
Chair: James Spudich
Associate Professors: Douglas L. Brutlag, Suzanne R. Pfeffer
Assistant Professors: Patrick O. Brown, Daniel Herschlag, Mark A. Krasnow

Biochemistry is a department within the School of Medicine. Department offices and labs are 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. Postdoctoral fellows, as well as house staff members, are also welcome to attend. A basic series in biochemistry (200, 201) is taught by the entire staff. Biochemistry 202 is designed for medical students and can be taken in lieu of 201. Students who elect to enroll in any of the above courses should have a good background in general and organic chemistry, and in cell biology, equivalent to the core series offered by the Department of Biological Sciences.

Advanced courses in more specialized areas are offered and they emphasize the most recent developments in biochemistry, cell biology, and molecular biology. These courses include the physical chemistry of proteins and nucleic acids, enzyme reaction mechanisms, membrane biology and biochemistry, mechanisms and regulation of nucleic acid replication and recombination, the biochemistry of bacterial and animal viruses, the molecular basis of morphogenesis, 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, analytical and preparative ultracentrifugation, amino acid and radioisotope analysis, and computer facilities. Labs are equipped for research with bacteria and bacteriophage, animal cells and their viruses, yeast, plants and Drosophila.

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
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 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 "Advanced Degrees" section of this bulletin. The department does not offer undergraduate degrees.

The Departments of Cell Biology and Biochemistry have a joint admissions 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, and 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. Applications are available from the department beginning September 1. 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 are strongly encouraged to 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. In addition, Stanford tuition costs are paid by the department.

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 proteins and nucleic acids including their enzymatic synthesis, chemical structure, physical chemistry and function; control and regulation of gene expression; the biochemistry and control of developmental processes; and the structure, function, and biosynthesis of cellular membranes and organelles.

COURSES


5 units, Win (Spudich, Kaiser, Kornberg, Lehman, Pfeffer) MTWThF 11

201. Advanced Molecular Biology — Lectures on rapidly developing frontiers in DNA structure and metabolism, chromosome structure and function, gene expression and its control, regulation of transcription, protein structure and function, RNA processing, and translation. Prerequisite: course in basic molecular biology.

5 units, Aut (Baldwin, Brown, Brutlag, Chu, Davis, Herschlag, Kornberg, Krasnow) MTWThF 11

202. Genes and Genomes — Structure and function of DNA and RNA molecules, methodologies for molecular genetic analysis, maintenance of genomes, regulated gene expression and comparative genetic strategies in development of yeast, Drosophila, nematodes, and mice genes and genomes. Three lectures and one optional discussion period per week. Enrollment limited to medical students or by consent of instructors. Prerequisite: 200 or equivalent.

4 units, Spr (Berg, Krasnow, Lehman) MWF 11

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, 201, or equivalents, and consent of instructor.

4 units (Pfeffer) not given 1994-95

211. Development in Microorganisms — (Same as Developmental Biology 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: regulation of cell division; sporulation in *B. Subtilis*; flagella and pili morphogenesis in *Caulobacter, E. coli* and *Salmonella*; bacteriophage assembly; genome rearrangements and positional information; cell-cell communication and multicellular development in *Myxococcus* and *Dictyostelium*; signal transduction pathways. Lectures and readings in current literature.

2 units (Kaiser, Shapiro) not given 1994-95

### 212. Cellular and Molecular Biology of Yeast —
The application of sophisticated methods of molecular and genetic analysis for studying the unicellular eukaryote *Saccharomyces cerevisiae* (haker's yeast) as a model system for basic problems in eukaryotic cellular and molecular biology. Topics: differentiation of cell type, regulation of the cell cycle, replication, recombination and segregation of the genome, regulation of gene expression, biogenesis and function of the cytoskeleton, organelle biogenesis, protein transport and secretion, and membrane receptors and signal transduction. Lectures and a review of pertinent literature with extensive student participation. Prerequisites: 200 and 201 (or equivalent), and consent of the instructors.

3 units (Botstein, Davis, Fuller) not given 1994-95

### 213. Developmental and Molecular Genetics of Drosophila —
Molecular and genetic analyses of the *Drosophila melanogaster* genome and how that genome controls development of the organism. Prerequisites: 200 and 201, and Biology 166 and 167 (or equivalent).

3 units (Hogness, Krasnow) not given 1994-95

### 214. Physical Biochemistry —
Physical chemistry of proteins, nucleic acids, and their complexes. Topics vary and have included molecular mechanisms of protein folding and protein-nucleic acid recognition. Current papers in the literature are discussed. Prerequisites: 200 and 201 (or equivalent), and a course in physical chemistry.

3 units (Baldwin) not given 1994-95

### 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 post-doctoral fellows.

1-3 units, any quarter (Staff) by arrangement

### 218. Computer Applications in 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, Spr (Brutlag) TTh 9-10:50

### 221. The Teaching of Biochemistry —
To be taken by all teaching assistants in 200, 201, 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 material expected, along with evaluations of class papers and examinations. Prerequisite: enrollment in the Biochemistry Ph.D. program or consent of instructor.

3 units, Aut, Win, Spr (Staff) by arrangement

### 222. 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. Molecular motors include forms of myosin, dynein, and kinesin. 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 1994-95

### 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, 201.

2 units (Kornberg, Lehman) not given 1994-95
299. Research
1-15 units, any quarter (Staff) by arrangement

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), Rachel Cohon (Philosophy), Ronald Davis (Biochemistry), Alain Enthoven (Business), Victor Fuchs (Economics, Health Research and Policy), Linda Giudice (In Vitro Fertilization and Reproductive Endocrinology Laboratories), Henry Greely (Law), Timothy Jackson (Religious Studies), Susan Okin (Ethics in Society Program, Political Science)

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 formulating fresh responses to contemporary ethical issues.

COURSES

For further information, see the University bulletin, School of Medicine.

MEDICINE

246. Ethical Values in Health Care in 1995:
Lessons from the Nazi Period — Health care issues from an historic perspective. Lessons from the actions of the German medical profession during the Nazi period. Clinical experimentation, the physician-patient relationship, rationing of health care, active and passive euthanasia and gene therapy in the context of social, economic, and political currents shaping the values and behavior of health care providers in Nazi Germany and the U.S.
3 units, Win (Fransblau, Raffin, Thaler)

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) T 2:25-5:05

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) T 2:15-5:05

CANCER BIOLOGY
PROGRAM

Committee on Cancer Biology: Martin Brown, (Professor of Radiation Oncology) Chair and Program Director; Michelle Calos (Associate Professor of Genetics), Martha Cyert (Assistant Professor of Biological Sciences), James Nelson (Professor of Molecular and Cellular Physiology), Frank Stockdale (Professor of Medicine)

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 "Advanced Degrees" section of this bulletin.
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 advising 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. 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.
5. The presentation of a Ph.D. dissertation as the result of independent investigation and contributing a contribution to knowledge in the area of cancer biology.
6. 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, given 1995-96

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) TTh 4:15-5:35
252. 1-3 units, Win (Staff) TTh 4:15-5:35
253. 1-3 units, Spr (Staff) TTh 4:15-5:35

299. Research — Students registered for the Ph.D. must register for this course as soon as they begin dissertation-related research work.

CELL BIOLOGY

Chair: Michael Levitt
Professors: Roger D. Kornberg, Michael Levitt, David B. McKay, Peter Parham
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 Cell 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 Cell 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.

Course work and lab instruction in the Department of Cell Biology conforms to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

COURSES

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)

222. 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., adenylyl cyclase cascade and the phosphoinositide cascade; 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.

3 units (Stryer)

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 results of experiment with theoretical molecular dynamics simulations. Enzyme catalysis is described in these terms. How these structures can be changed to engineer novel molecules from the experimental and predictive aspects; use of interactive computer graphics programs to 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 (Kornberg)

232. Macromolecular Structure: Diffraction Methods and Diffraction Results — General methods and notable accomplishments of x-ray crystal-
lography 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 (Weis, McKay)

235. Structural Biology — Introduction to structural biology for graduate students in the chemical and biological sciences. Basic principles of folding patterns and structural themes found in proteins and nucleic acids. Experimental (x-ray diffraction, electron microscopy), theoretical, and computer-graphics methods used to derive and evaluate structural and dynamic information from macromolecules, emphasizing the capabilities and the limitations of the methods. Topics of current interest in protein and nucleic acid structure and function. Prerequisite: knowledge of basic biochemistry.

3 units, Win (Levitt, McKay, Weis, Kornberg)

237. Introduction to Biotechnology — (Same as Biology 237, Biophysics 237, Chemical Engineering 237, Chemistry 237.) Faculty from the Departments of Biological Sciences, Cell Biology, Chemical Engineering, Chemistry, Civil Engineering, Biochemistry, Genetics, Electrical Engineering, Molecular Pharmacology, Neurobiology, and Developmental 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 and engineering.

3 units, Spr (Boxer, Goochee, Kornberg, Yanofsky)

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)

DEVELOPMENTAL BIOLOGY

Chair: Lucy Shapiro

Professors: Bruce Baker, David Clayton, Gerald Crabtree, David Hogness, Dale Kaiser, Matthew Scott, Lucy Shapiro, James Spudich, Irving Weissman

Associate Professors: Margaret Fuller, Roeland Nusse

Assistant Professors: Stuart Kim, David Kingsley

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 basic 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.

The Department of Developmental Biology assembles 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. Areas of study are represented in the developmental genetics of microbial systems, Drosophila, the nematode, and the mouse. 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.

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.

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**

210. Developmental Biology — (Same as Biological Sciences 208.) 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). Acquaints graduate students and upper-level undergraduates with advances in current developmental biology. 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 (Baker, Clayton, Crabtree, Fuller, Hogness, Kaiser, Kim, Kingsley, Nusse, Scott, Shapiro, Spudich, Weissman) not given 1994-95

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: regulation of cell division; sporulation in B. Subtilis; flagella and pili morphogenesis in Caulobacter, E. coli and Salmonella; bacteriophage assembly; genome rearrangements and positional information; cell-cell communication and multicellular development in Myxococcus and Dictyostelium; signal transduction pathways. Lectures/readings in current literature.

2 units, Spr (Kaiser, Shapiro)

215. Frontiers in Developmental Biology — Seminar series that presents the latest advances in understanding the genetic control of development. Every other week, distinguished scientists from the national and international community visit Stanford to present a seminar and review future directions of their work. Background material is presented by reviewing relevant scientific papers in the week prior to the seminar. Topics: developmental genetics in Drosophila and C. elegans, early development in the mouse, muscle development, neural development, microbial and fungal development, and the function of the immune system.

1 unit, Aut, Win, Spr (Kim, Kingsley)

217. Mammalian Developmental Genetics — 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 cloning, mutagenesis and insertional 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 teratocarcinomas. One lecture per week, plus one guest lecture or a literature discussion.

2 units, Win (Barsh, Nusse) given 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. Molecular motors include forms of myosin, dynein, and kinesin. 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, re-
constitution 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) given every 3rd year

229. Molecular and Genetic Medicine — For medical students about to undertake clerkships. Designed to stimulate ideas about novel applications of basic research in molecular, cellular, and developmental biology to clinical medicine. Observation, experimentation, and advances in technology are brought to bear on fundamental problems of biomedical science. The connections between recently discovered classes of regulatory genes and genetically inherited diseases is emphasized. Lectures stress the problem-solving aspects of research applied to a disease or disease process, and what is known and what remains to be learned. Mini-symposia on selected topics. Minimum enrollment of 20. Prerequisites: Biochemistry 200, 202, and Genetics 201.

2 units, Win (Clayton, Crabtree)
M 3:15-5:05

399. Research — Must register by section numbers. 1-18 units, any quarter (Staff) by arrangement

EPIDEMIOLOGY PROGRAM

Director: Jennifer L. Kelsey (Professor of Health and Research Policy)
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, Divisions of Endocrinology, Gerontology, and Metabolism), Alice S. Whittemore (Health Research and Policy, Division of Epidemiology)
Gynecology and Obstetrics: Emmet Lamb (Professor), Mary L. Polan (Professor)
Health Research and Policy: Paul Basch (Professor), 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 (Assistant Professor), David Thom (Assistant Professor), Alice Whittemore (Professor)

Medicine: John Farquhar (Professor), Stephen Fortmann (Associate Professor), James Fries (Professor), William Haskell (Professor), Haistead Holman (Professor), Helena Kraemer (Professor), Robert Marcus (Professor), Julie Parsonnet (Assistant Professor), Gary Schoolnik (Professor), Marcia Stefanik (Research Associate), David Thom (Assistant Professor), Lucy Tompkins (Associate Professor), Marilyn Winkleby (Senior Research Scientist)

Microbiology and Immunology: Gary Schoolnik (Professor), Lucy Tompkins (Associate Professor)
Neurology and Neurological Sciences: Leslie Dorfman (Professor)
Neurobiology: Denis Baylor (Professor)
Program in Cancer Biology: J. Martin Brown (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 (Senior Research Scientist)

GRADUATE PROGRAM

The Epidemiology Program offers interdisciplinary instruction and research opportunities leading to M.S. and Ph.D. degrees in Epidemiology. The program has strengths in the following areas of epidemiology: cancer; cardiovascular, infectious, musculoskeletal, and neurological disease; some aspects of epidemiologic methods; and genetic, reproductive, and 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 MS. program should have previous course work 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 (Sta-
tistics 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 course work 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), and also HRP 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, infectious diseases, musculoskeletal diseases, neurological 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 Faculty 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), HRP 223 (Physiologic Basis of Cardiovascular Disease Prevention and Epidemiology), Human Biology 166 (Cardiovascular Disease Prevention and Epidemiology), HRP 204 (Medical Microbiology), Microbiology and Immunology 202 (Medical Microbiology), 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 examination covers: (1) epidemiologic methods, (2) biostatistics, and (3) a specialty area (for example, epidemiology and pathobiology of cancer, 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

Course work and laboratory instruction in the Epidemiology Program conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

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
Professors: David Botstein, Stanley N. Cohen, David R. Cox, Ronald W. Davis, Uta Francke, Leonard A. Herzenberg, Matthew P. Scott, Lucy Shapiro
Associate Professors: Michele P. Calos, Margaret T. Fuller, Richard M. Myers
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 genetics, yeast genetics, Drosophila developmental genetics, mouse genetics, immunogenetics, and (by 1995) 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. Two 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 “Advanced 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, Cell Biology, Developmental Biology, and Microbiology and Immunology.

**201. Human Genetics — Theoretical and experimental basis for human genetics. Lectures/reading in all aspects of genetics, including molecular, chromosomal, cellular, developmental, population, and medical genetics, emphasizing the latter. Prerequisites: knowledge of biochemistry and basic genetics.**

4 units, Spr (Cox, Francke, Bansh)
T 10 WTh 9

**203. Advanced Genetics — (Same as Biological Sciences 203.) Explores the genetic toolbox. Studies 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 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 (Botstein, Baker) TTh 9

206. Evolution of Chromosomes—How chromosomes evolved into complex structures and how these structures carry out the functions required of them, reviewed in phylogenetic sequence, from bacteria to mamalian cells. At each level of organization, the form and function of the genetic material is considered, with emphasis on how the genome codes for replication, centromeres, and telomeres. Also, the evolution and function of repeat sequences.

3 units, Win (Calos) alternate years, not given 1995-96

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 1995-96

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 on molecular genetics and on experimental approaches.

4 units, Spr (Cox) by arrangement

260. Supervised Study—Prerequisite: consent of instructor.

any quarter (Staff) by arrangement

299. Directed Reading—Prerequisite: consent of instructor.

any quarter (Staff) by arrangement

399. Individual Research—Prerequisite: consent of instructor.

any quarter (Staff) by arrangement

Assistant Professors: Laurence Baker, John C. Hornberger, Lorene M. Nelson, Julie Parsonnet

Lecturers: Irene Corso, Margaret L. Eaton, Sally L. Glaser, Pamela Horn-Ross, Susan T. Sacks, Stephen Van Den Eeden, Marilyn Winkleby

Participating Faculty: Alain C. Enthoven (Business), Stephen P. Fortmann (Medicine), James F. Fries (Medicine), Alan M. Garber (Medicine), Henry T. Greely (Law), Peter Gregory (Medicine), Halsted R. Holman (Medicine), Rudolf H. Moos (Psychiatry), Douglas Owens (Medicine), W. Richard Scott (Sociology), Edward H. Shortliffe (Medicine and Computer Science), David Thom (Medicine), Amos Tversky (Psychology)

The Department of Health Research and Policy has three divisions:
1. Biostatistics deals with scientific methodology in the medical sciences, emphasizing the use of statistical techniques.
2. Epidemiology provides training and experience in the application of epidemiologic methods to the study of disease etiology and control. It is also concerned with problems of health and disease in human populations in all parts of the world and with efforts toward improving levels of health.
3. Health Services Research is concerned with many aspects of health policy analysis in the public and private sectors.

The Department, and each division, offers courses in its areas of specialization. These are described fully in the Stanford University bulletin, School of Medicine.

COURSES

202. Biostatistics and Epidemiology—Required for medical students. Introduces statistical reasoning and the application of common statistical procedures used in lab and clinical investigations. Lectures, group discussions, and assigned problems. Epidemiological concepts, techniques, and studies are highlighted.

4 units, Win (Lavori, Parsonnet) WF 9-10:50
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) MWF 11

206. Methodology Seminar: Meta-Analysis — Statistical Methods for Combining Information — (Same as Statistics 211, Education 493B.) Meta-analysis is a quantitative method for combining results of independent studies. 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, not given 1994-95

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) M 7-9 p.m.

210. Health Law and Policy — (Same as Law 381.) Non-law students admitted with the consent of instructor. Introduces some of the legal, policy, and ethical issues spawned by the health industries. Focuses on: quality assurance through malpractice litigation, peer review, etc.; health care financing through Medicare, Medicaid, private insurance, and health maintenance organizations; and bioethical issues (the definition of death and the “right-to-die”).

5 units, Spr semester (Greely) Th F 10:40-11:55

211. Advanced Issues in Health Law and Policy — (Same as Law 464.) Non-law students admitted with the consent of the instructor. Current issues in health law and policy. Focuses on conflicts of interest in medicine including financial conflicts between doctors, patients, and insurers or government financing bodies; ethical conflicts between doctors, patients, and society; and wide-ranging conflicts between medical researchers and patients. Develops an integrated view of the appropriate role for law in limiting health provider’s discretion. Explores issues of interest through student-guided presentations. Enrollment limited to 18. Prerequisite: 210, 391 or equivalent.

5 units (Greely) not given 1994-95

214. Environmental Health — Methods for the study of environmental factors that influence human health, leading to measures for their control, emphasizing current problems. Physiological coping mechanisms and controversial issues of environmental health protection. Possible topics: ozone air pollution, poisonous dusts, halogenated hydrocarbons in water, and radon and cancer. Experts from the medical faculty and from other institutions assist in discussions. Limited to 12 students.

2 units, Win (Beard, Staff) by arrangement

224. Statistical Issues in Epidemiology — Selected advanced problems in the design and analysis of epidemiological studies, motivated by published investigations. 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 studies and genetic studies. Prerequisites: 203, 225, and 226, or equivalents.

3 units, Aut (Whitemore)

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: Biostatistics 202 or equivalent, or consent of instructor. 3-4 units, Aut (Kelsey) W 3-5:30

226. Advanced Epidemiologic Methods — Advanced level. Emphasis is on principles of measurement, measures of effect, confounding, effect modification, and strategies for minimizing bias in epidemiologic studies. Data management principles. Lectures, readings, and problem sets. Prerequisite: 203, 225, or consent of instructor. 3-4 units, Win (Nelson) MW 10:30-12

227. Epidemiology of Musculoskeletal and Neurologic Disorders — Epidemiologic contributions to understanding the etiology of conditions such as osteoporosis and fractures, congenital and developmental bone malformations, 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 neu-
rologic disorders are emphasized. Prerequisite: 225 or consent of instructors.

3 units (Kelsey, Nelson, Hubert) not given 1994-95

228. Molecular Epidemiology — Examines genetic and biochemical markers of exposure and risk. Topics: DNA fingerprinting to determine transmission pathways, vaccine design based on pathogen genetics, host genetic characteristics as determinants of disease risk and their potential use in screening, and biochemical markers of environmental exposures. Evaluation of techniques as applied to infectious diseases, oncology, and occupational health. Prerequisites: 223 or 225 and Medicine 229, or consent of instructors.

3 units, Spr (Parsonnet, Basch) by arrangement alternate years, not given 1995-96

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 (Basch, Parsonnet) alternate years, given 1995-96

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) T 1-2:30

256. Economics of Health and Medical Care — (Same as Medical Information Sciences 256, Economics 156/256; undergraduates enroll in 156.) Open to graduate students and advanced undergraduates with training in microeconomics and some background in statistics or mathematics. Empirical, institutional, and theoretical analysis of problems of health and medical care. Topics: measurement, valuation, and determinants of health; physicians, hospitals, and the drug industry; financing and organization of medical care; public policy issues. Prerequisite: Economics 51 or consent of instructor.

5 units, Spr (Phibbs)

260A,B,C. Workshop in Biostatistics — (Same as Statistics 260A,B,C) Applications of statistical techniques to current problems in medical science. Enrollment for more than 2 units involves extra reading and consent of the instructor.

1-5 units, Aut, Win, Spr (Efron, Olshen) Th 1:15-3:05

270. International Health — Discussion of world distribution of selected diseases and health problems; international organizations and control programs; environmental, social, and economic factors in relation to health, particularly in developing countries; and comparative health care systems in poor and wealthy countries. Also, preparation for work and experience abroad. Prerequisite: consent of instructor.

1-18 units, any quarter (Basch) by arrangement

279. Management of Hospitals and Other Health Care Institutions — Administrative aspects of health care institutions. Organizational elements of hospitals, administration, financial issues and problems, hospital departmental relationships, quality of patient care, principal external pressures (governmental and nongovernmental), consumerism, and community influence.

3 units, Spr (Holloway) Th 3:15-6

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 (I. Corso) T or Th 7-9 p.m.

281. Spanish II for Medical Students — (Same as Spanish 122M.) Continuation of 280. Prerequisites: 280 or equivalent.

3 units, Win (I. Corso) T or Th 7-9 p.m.

282. Spanish III for Medical Students — (Same as Spanish 123M.) Continuation of 281. Prerequisite: 281 or equivalent.

3 units, Spr (I. Corso) Th 7-9 p.m.

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, Hornberger, Owens) W 1:30-3

299. Directed Reading — Includes various 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) by arrangement

390. Quality Assurance in Health Care — (Same as Business 333.) 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, Spr (Enthoven)

391. Political Economy of Health Care — (Same as Business 331.) 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 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) MF 8-10

392. Cost-Benefit Analysis in Health Care — (Same as Business 332, Medical Information Sciences 432.) For graduate students. How do you do cost-benefit analysis when the “output” is difficult or impossible to measure? Study/discussion of the main literature on the principles of cost-benefit analysis applied to health care. A critical review of actual studies. Emphasis is on the art of practical application.

4 units, Aut (Enthoven, Garber)

399. Research — Allows qualified students to undertake investigations sponsored by individual faculty members. Prerequisite: consent of the instructor.

1-18 units, any quarter (Staff) by arrangement

HEALTH SERVICES RESEARCH PROGRAM

Director: Mark Hlatky (Associate Professor of Health Research and Policy, and Medicine)

Executive Committee: Alan Garber (Assistant Professor of Medicine), Mark Hlatky (Associate Professor of Health Research and Policy, and Medicine), John Hornberger (Assistant Professor of Health Research and Policy), Douglas Owens (Assistant Professor of Medicine)

Participating Departments and Faculty:
Economics: Thomas MacCurdy (Professor)
Business, Graduate School of: Alain Enthoven (Professor)
Health Research and Policy: Laurence Baker (Assistant Professor), Paul Barnett (Consulting Assistant Professor), Byron W. Brown (Professor), Victor Fuchs (Professor), Mark Hlatky (Associate Professor), Donald Hollo-

way (Lecturer), John Hornberger (Assistant Professor), Jennifer Kelsey (Professor), Philip Lavori (Professor, Research), Ciaran Phibbs (Consulting Assistant Professor), Anita Stewart (Visiting Scholar)

Industrial Engineering: Margaret Brandeau (Associate Professor)

Law: Henry Greely (Professor)

Medicine: Alan Garber (Associate Professor), Mary Goldstein (Assistant Professor), Leslie Lenert (Assistant Professor), Douglas Owens (Assistant Professor)

Psychiatry: Rudolph Moss (Professor)

Psychology: Amos Tversky (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 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.
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 231, 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; Sociology 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 T264, Stanford, California 94305-5092.

COURSES

Course work and lab instruction in the Health Services Research Program conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.
The course listings of individual departments participating in the Health Services Research Program should be consulted for complete descriptions.

IMMUNOLOGY PROGRAM

Director: Mark D. Davis (Professor of Microbiology and Immunology)
Committee on Immunology: Yueh-hsiu Chien (Associate Professor of Microbiology and Immunology), Phyllis Gardner (Associate Professor of Molecular Pharmacology and Medicine), Alan Krensky (Professor of Pediatrics), Gary Nolan (Assistant Professor of Molecular Pharmacology), Jane Parnes (Associate Professor of Medicine/Immunology and Rheumatology), Irving Weissman (Professor of Pathology and of Developmental Biology); Elizabeth Kerr (Graduate Student)

Participating Departments and Faculty:
Biological Sciences: Patricia P. Jones (Professor)
Cardiovascular Surgery: Carol Clayberger (Assistant Professor)
Cell Biology: Peter Parham (Professor)
Chemistry: Harden M. McConnell (Professor)
Genetics: Leonard A. Herzenberg (Professor), Lenore Herzenberg (Professor, Research)
Medicine/Clinical Pharmacology: Kenneth Melmon (Professor)
Medicine/Hematology/Bone Marrow Transplantation Program: Robert Negrin (Assistant Professor)
Medicine/Immunology and Rheumatology: C. Garrison Fathman (Professor), Jane R. Parnes (Associate Professor), Samuel Strober (Professor)
Medicine/Oncology: Ronald Levy (Professor)
Microbiology and Immunology: Yueh-hsiu Chien (Associate Professor), Mark M. Davis (Professor), Christopher Goodnow (Assistant Professor), Hugh O. McDevitt (Professor)
Molecular and Cellular Physiology: Richard S. Lewis (Assistant Professor)
Molecular Pharmacology: Garry P. Nolan (Assistant Professor)
Molecular Pharmacology and Medical/Clinical Pharmacology/Cardiovascular Medicine: Phyllis Gardner (Associate Professor)
Pathology: Eugene C. Butcher (Associate Professor), Michael Cleary (Associate Professor), Gerald R. Crabtree (Professor), Edgar G. Engleman (Professor), Joseph S. Lipsick (Associate Professor), Sara Michie (Assistant Professor), Raymond A. Sobel (Associate Professor), Roger A. Warnke (Professor), Irving L. Weissman (Professor)
Pediatrics: Alan M. Krensky (Professor), Dale T. Umetsu (Associate Professor)
Surgery: John E. Niederhuber (Professor)

GRADUATE PROGRAM

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. Interested students should contact the Immunology Program office. 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).

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.

**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 basic biomedical sciences and who can carry out innovative research in immunology. 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 should have an undergraduate major in biological sciences; majors in other sciences may be acceptable if the applicants have had sufficient course work in biology. 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 biology, biochemistry, or chemistry), which should be taken by the October test date; grades; evidence of prior research experience in biological sciences; 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 and a living stipend. 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 three Immunology faculty, including the dissertation adviser and a member of the Immunology Predoctoral Committee, 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 "Advanced 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, graduate level (Molecular and Cellular Physiology 221)
   e) Basic genetics
   f) Statistics (Biology 141 or Health Research and Policy 202)

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 (usually 5-6 p.m. Wednesdays). Students read the papers of and have lunch 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 immunology courses.

7. For admission to candidacy, completion of three 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. A research proposal on a subject other than the student's own research must be written by the end of Winter Quarter. 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 Wednesday afternoon immunology seminars, and the annual Stanford Immunology Retreat.

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 Activities as stated in the back of this catalog.

201, 202. Advanced Immunology—(Same as Microbiology and Immunology 211, 212.) 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); 201 is a prerequisite for 202.

201. 3 units, Win (Chien, Staff) MWF 1:15
202. 3 units, Spr (Davis, Staff) MWF 11:29

290. Teaching of Immunology—Practical experience in teaching by serving as a teaching assistant in an immunology course.

(Staff) by arrangement

300. Research—Research for graduate students in the Ph.D. program in Immunology.

1-15 units (Staff) by arrangement

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 (Goodnow) by arrangement

**BIOLOGICAL SCIENCES**

230. Molecular and Cellular Immunology—Introductory immunology for graduate students and advanced undergraduates. Basic elements 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. Undergraduate prerequisites: Biology Core or consent of instructor.

3 units, Aut (Jones) MWF 10

335. Seminar in Immunobiology and Immunogenetics—Literature review of current topics in immunology. Prerequisites: introductory immunology course and consent of instructor (for undergraduates).

1-2 units, Aut, Win; Spr (Jones) M 12:15

**MICROBIOLOGY AND IMMUNOLOGY**

200. Immunology—(Same as Pathology 220.) Principally for medical, graduate, and advanced undergraduate students. Immunology as related to medicine is emphasized. Prerequisites: basic principles of genetics and introductory courses in biochemistry (equivalent to 200-201) and histology.

3 units, Spr (McDevitt, Weissman, Goodnow) MWF 10

200A. Problem Solving in Immunology—(Same as Pathology 220A.) Provides direct experience in understanding immunology using problems. Three to five problems are corrected and discussed weekly. Corequisite: 200.

1 unit, Spr (McDevitt, Weissman, Goodnow) by arrangement

**MEDICAL INFORMATION SCIENCES PROGRAM**

Committee: Edward H. Shortliffe, Chair and Program Director (Professor of Medicine and by courtesy, Computer Science); Lawrence M. Fagan, Co-Director (Medical Informatics); Russ B. Altman (Assistant Professor of Medicine and by courtesy, Computer Science),
Douglas L. Brutlag (Associate Professor, Biochemistry), Parvati Dev (Senior Research Scientist, Surgery), Alan M. Garber (Associate Professor of Medicine), Leslie Lenert (Assistant Professor of Medicine), Mark A. Musen (Assistant Professor of Medicine and by courtesy, Computer Science), Thomas C. Rindfleisch (Senior Research Scientist, Medicine), Michael G. Walker (Senior Research Scientist, Medicine), G. Wiederhold (Professor of Computer Science, and Medicine)

Participating Faculty by Department:

opportunities for research are not limited to
the specific faculty and departments listed.

Anesthesia: David M. Gaba (Associate Professor)

Biochemistry: Douglas L. Brutlag (Associate Professor)

Business, School of: Alain C. Enthoven (Professor)

Computer Science: Russ B. Altman (Assistant Courtesy Professor), Thomas O. Binford (Professor), Edward A. Feigenbaum (Professor), Michael L. Genesereth (Associate Professor), Marc Levoy (Assistant Professor), Mark A. Musen (Assistant Professor), Edward H. Shortliffe (Professor), G. Wiederhold (Professor)

Economics: Victor R. Fuchs (Professor), Alan M. Garber (Associate Courtesy Professor)

Education, School of: Lee S. Shulman (Professor), Richard E. Snow (Professor)

Electrical Engineering: Albert Macovski (Professor), G. Wiederhold (Professor)

Engineering-Economic Systems: Samuel Holtzman (Consulting Associate Professor), Ronald A. Howard (Professor), Ross D. Shachter (Associate Professor), Edison Tse (Associate Professor)

Genetics: David Botstein (Professor), Stanley N. Cohen (Professor)

Health Research and Policy: Byron W. Brown, Jr. (Professor), John P. Bunker (Professor), Alan M. Garber (Associate Professor), 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 (Assistant Professor), Lawrence M. Fagan (Senior Research Scientist), James F. Fries (Professor), Alan M. Garber (Associate Professor), Max Henrion (Consulting Associate Professor), Leslie Lenert (Assistant Professor), Mark A. Musen (Assistant Professor), Douglas K. Owens (Assistant Professor), Richard L. Popp (Professor), Glenn Rennels (Consulting Assistant Professor), Thomas C. Rindfleisch (Senior Research Scientist), Edward H. Shortliffe (Professor), Michael G. Walker (Senior Research Scientist)

Obstetrics and Gynecology: Emmet J. Lamb (Professor)

Pathology: Howard H. Sussman (Professor)

Psychology: Amos N. Tversky (Professor)

Radiology: Gary M. Glazer (Professor), Gary H. Glover (Professor), Sandy A. Napel (Assistant Professor), Norbert J. Pelc (Associate Professor), Leslie M. Zatz (Professor)

Statistics and Biostatistics: Byron W. Brown, Jr. (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, NeXT, 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 letter grade indicator (LGI) 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, and Graduate Special Programs). 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.

**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 (9 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), and 212 (Project Course).

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, 161, and 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 (EES) 221 (Probabilistic Analysis); Statistics 200 (Introduction to Statistical Inference) or Statistics 201 (Statistical Methods) or MIS 203 (Intermediate Biostatistics); and EES 231 (Decision Analysis).

4. **Biomedicine (7-10 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 Human Biology 111 (Human Physiology) 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 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.

Note that the core curriculum generally entails a minimum of 42 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 "Advanced 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 9 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 or Statistics numbered 200 or higher, courses in Operations Research numbered 150 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 post-doctoral 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, etc.) are discussed in the “Advanced 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 letter grade indicator (LGI) as outlined from 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 an LGI 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 presents 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 Information Sciences 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, Th 3-4

201. Medical Information Sciences Journal Club—Journal club for all students and several faculty. Participants report on recent relevant articles from the MIS literature. 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, T 3-4

202. Clinical Diagnosis — Open only to students in an MIS degree program. Designed for learning of 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, by arrangement

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) MWF 11

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) by arrangement

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, by arrangement

210. Computer Applications in Medicine—(Same as Computer Science 270.) Survey of use of computers in the medical field. Includes 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, ambulatory care systems, medical databases and networking, bibliographic search, applications to molecular biology, aids for disabled patients, image processing, computer-aided instruction, decision support systems.

3 units, Aut (Fagan, Shachter) TTh 1:30-2:45

211. Computer-Based 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) TTh 1:30-2:45

212. Medical Informatics Project Course—For students who have completed 210 or 211 and who wish to implement those ideas in a computer program. Prerequisites: programming experience, 210 or 211.

3 units, Spr (Walker, Fagan) TTh 1:30-2:45


3 units, Spr (Shachter) TTh 9:30-10:45

229. Seminar on Expert-Systems Research — For graduate students. Historical perspective and technical understanding of research in knowledge-based systems. Classic work from the 1970s and 80s
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, Spr (Musen, Shortliffe) W 3:30-5

231. Computer Applications in 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 are 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, Spr (Brutlag) TTh 9-10:50

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) by arrangement

250. Health and Society — (Enroll in Health Research and Policy 200.) Introduction to epidemiology, preventive medicine, and health care organization through lectures, panel discussions, and student projects. Prerequisite: consent of instructor.

3 units, Win (Hlatky, Staff) M 9-10:50 T 10

256. Economics of Health and Medical Care — (Same as Economics 156/256, Health Research and Policy 256.) Open to graduate students and undergraduates with training in microeconomics and some background in statistics or mathematics. Empirical, institutional, and theoretical analysis of problems of health and medical care. Topics: measurement, valuation, and determinants of health; physicians, hospitals, and the drug industry; financing and organization of medical care; public policy issues. Prerequisite: Economics 51 or consent of instructor.

5 units, Spr (Phibbs)

299. Directed Reading and Research — For students wishing to receive credit for directed reading or research time.

any quarter, by arrangement

301. Special Topics in Medical Informatics

1-6 units, any quarter (Staff)

348. Computer Graphics: Image Synthesis Techniques — (Enroll in Computer Science 348B.) 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 antialiasing and photorealism, human vision and color science as they relate to computer displays, and high-performance architecture for graphics. Written assignments and programming projects. Prerequisite: Computer Science 248, or equivalent.

4 units, Win (Levoy) TTh 9:30-10:45

354. Probabilistic Reasoning in Computing — (Enroll in Computer Science 354.) Basics of (Bayesian) probability theory as applied to computing and artificial intelligence. Theory is illustrated by case studies. Practical problems in learning, search, approximate reasoning, data analysis, and decision-making under uncertainty. Emphasis is on solving practical inference problems under uncertainty, including their computational aspects. Surveys probabilistic theory and techniques, emphasizing practical rather than theoretical concerns. Prerequisites: Computer Science 106B or X, 221, and a knowledge of basic statistical measures as in Psychology 60.

3 units (Bunine, Cheeseman)

alternate years, given 1995-96

432. Cost-Benefit Analysis in Health Care — (Same as Business 332, 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 a number of actual case studies. Emphasis on the art of practical application.

4 units, Aut (Enthoven, Garber)
Emeriti: (Professors) Sidney Raffel, Robert J. Roantree, Leon T. Rosenberg, Carlton E. Schwerdt, John P. Steward, *Bruce A. D. Stocker; (Research Professor) Esther M. Lederberg

Chair: James I. Mullins

Professors: Ann Arvin (jointly with Pediatrics), Mark M. Davis, Stanley Falkow (jointly with Infectious Diseases and Geographic Medicine), Harry B. Greenberg (jointly with Gastroenterology), Abdul Matin, Hugh O. McDevitt, James I. Mullins, John Niederhuber (jointly with Surgery/Oncology), Peter Parham (jointly with Cell Biology), Charles Prober (jointly with Pediatrics), Gary K. Schoolnik (jointly with Infectious Diseases and Geographic Medicine)

Associate Professors: John C. Boothroyd (jointly with Infectious Diseases and Geographic Medicine), Yueh-hsiu Chien, Edward S. Mocarski, Lucy S. Tompkins (jointly with Infectious Diseases and Geographic Medicine)

Assistant Professors: Christopher Goodnow, Kasturi Haldar, David Relman (jointly with Infectious Diseases and Geographic Medicine)

* 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 PROGRAM

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 biology, molecular biology, or chemistry) 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 (each usually one quarter). During the first year of graduate study in the department, each student also takes six upper-level (200-series) courses. Three, including Microbiology and Immunology 215 and 218, must be from this department. The other three may be in one of the many departments at Stanford with overlapping interests, for example, Biochemistry, Biological Sciences, Cell Biology, Chemistry, Computer Science, Developmental Biology, Genetics, Health Research and Policy, and Pathology.

In the Autumn Quarter of the second year, each student takes the written qualifying exams, which ensure that a comprehensive understanding of the basic subject areas of microbiology and immunology have been attained. In the Winter Quarter of the second year, a written research proposal is prepared by the student and submitted and defended in an oral exam to a faculty committee. The subject of this proposal is other than the intended thesis project. Based on successful performance on these two exams, the student is admitted to candidacy. Teaching experience and training are part of the graduate curriculum. All
graduate students are required to act as teaching assistants for two quarters as part of their training.

COURSES

3 units, Aut (Matin) MWF 11

198A-F. Undergraduate Directed Reading — Prerequisite: consent of instructor.
15 units maximum, any quarter (Staff)
by arrangement

198A. Microbiology
198B. Immunology
198C. Virology
198D. Parasitology
198E. Microbial Molecular Biology and Physiology

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) by arrangement

200. Immunology — (Same as Pathology 220.) Principally for medical and graduate students but may be taken by advanced undergraduates. Immunology as related to medicine is emphasized. Prerequisites: basic principles of genetics and introductory courses in biochemistry (equivalent to 200-201) and histology.
3 units, Spr (Goodnow, McDevitt, Weissman) MWF 10

200A. Problem Solving in Immunology — (Same as Pathology 220A.) Provides direct experience in understanding immunology, using problems. 3-5 problems are corrected and discussed weekly. Corequisite: 200.
1 unit, Spr (Goodnow, McDevitt, Weissman)
by arrangement

202. Medical Microbiology — Limited to medical and graduate students; others must have consent of the instructor. Lectures on the fundamentals of pathogenic microbiology, including bacteria and animal viruses. Some aspects of immunology, lab diagnosis, and preventive measures.
6 units, Aut (Schoolnik, Falkow, Tompkins, Mullins, Greenberg, Arvin, Prober, Relman) TTh 1:15-3:05 F 9-10:50

203. Biological Stress Response — Biological stress responses to heat, radiation, osmotic changes, nutrient death, etc., have common features preserved in evolution. Seminar deals with regulation and function of stress proteins, including role in development, teratogenesis, immunity, the pathogenic process, and cancer treatment, drawing on literature on bacteria, lower eukaryotes, and mammalian cells. Enrollment limited to 15. Prerequisite: consent of instructor.
3 units, Spr (Matin, Staff) MWF 4 alternate years, not given 1995-96

4 units, Spr (Mocarski) MWF 3:15

207. Pathogenesis of Infectious Diseases — Emphasis: an understanding of the molecular mechanisms employed by microorganisms to bring about the infection of animal and human hosts. Formal instruction plus class discussion of recent literature pertaining to microbial pathogenicity and normal and acquired host surface mechanisms. Sign-up list requested. Prerequisite: consent of instructor.
3 units, Win (Falkow, Relman) W 3:15-5:05 alternate years, not given 1995-96

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: 206.
1 unit, Win (Mocarski) M 10

209. Molecular Parasitology — Advanced seminar on the molecular biology of parasites, especially protozoa. Topics: trypanosome antigenic variation, transsplicing, RNA editing, malaria vaccines, intracellular parasitism and ultrastructure, viruses, genetics, and cell biology of parasitic protozoa. Prerequisite: Biochemistry 201 or consent of instructor. Recommended: a background in parasitology, e.g., Health Research and Policy 204.
2 units, Win (Boothroyd, Haldar) Th 3:15-5:05 alternate years, not given 1995-96

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 immu-
nology, consent of instructor (for undergraduates); 211 is a prerequisite for 212.

211. 3 units, Win (Chien, Staff) MWF 1:15
212. 3 units, Spr (Davis, Staff) MWF 11

215. Principles of Biological Technologies — 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) T 2:30-4:30

218. Papers in the Biological Sciences — Required of first-year graduate students in Microbiology and Immunology. Discussion of current and classic papers in modern molecular biology, emphasizing the fields of microbiology and immunology, and the perspectives of their logic and experimental design. In-depth discussion and critical analysis of biochemical and physical methods employed in testing hypotheses.

   2 units, Win (Goodnow, Staff) T 6-8 alternate years, not given 1995-96

299. Directed Reading — Prerequisite: consent of instructor.

   18 units maximum, any quarter (Staff) by arrangement

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) by arrangement

MOLECULAR AND CELLULAR PHYSIOLOGY

Emeriti: (Professor) Julian M. Davidson
Chair: W. James Nelson
Assistant Professors: Brian Kobilka (jointly with Medicine), Richard S. Lewis, Thomas L. Schwarz
Courtesy Professor: Jeffrey J. Wine
Courtesy Associate Professors: Andrew R. Hoffman, Ron R. Kopito, Timothy Meyer, Thomas A. Raffin
Courtesy Assistant Professor: Anson W. Lowe

The Department of Molecular and Cellular Physiology is located in the Beckman Center for Molecular and Genetic Medicine.

The creation and growth of the department is a reflection of the rapid development of the field of cellular signaling as it relates to intracellular, intercellular, and interorgan communication. The department has developed a special focus on molecular mechanisms controlling excitability, contraction, secretion, neurotransmission, membrane and axonal transport, and other key physiological processes. The research programs draw on a wide range of techniques including biochemistry, cell biology, electrophysiology, imaging with light or electron microscopy, and molecular genetics. The department teaches physiology to medical and graduate students, and also continues research in the field of neuroendocrinology.

GRADUATE PROGRAMS

The department offers required and elective courses for students in the School of Medicine and is also open to other qualified students with the consent of the instructor. Training of medical, graduate, and postdoctoral students is available. The program offers a course of study leading to the Ph.D. degree. No B.S. is offered, and an M.S. is offered only in the unusual circumstance where a student completes the course work, rotation, and the written section of the qualifying exam, but is unable to complete the requirements for the Ph.D.

DOCTOR OF PHILOSOPHY

Students with undergraduate or master’s degrees who have completed a year each of college chemistry (including lectures in organic and physical chemistry), physics, calculus, and biology are considered for admission to graduate study. Applicants submit a report of scores from the Graduate Record Examination (verbal, quantitative, analytical, and an advanced subject test in one of the sciences) as part of the application. Students who do not speak English as their native language must submit scores from TOEFL unless waived by Graduate Admissions, the Registrar’s Office.

Study toward the Ph.D. is expected to occupy four to five years, including summers. A minimum of seven quarter-long courses are required. Students take Biochemistry 200 and 201, and one of the medical physiology courses (Molecular and Cellular Physiology 200, 201, 202, 203 or 204). Neurobiology 200 is recommended. At least three of the student’s required courses are more focused advanced graduate-level courses in areas such as molecular and cellular physiology, cellular signaling, cell biology, or pharmacology.
Each student presents a journal club to the department at least every other year, starting their second year. Acceptable letter grade indicators (LGI) for all course work must be a minimum of ‘B-,’ and at least two grades equal to ‘A-’ or above are necessary (but not sufficient) for continuation in the program.

Qualifying Examination—At the end of the second year in residence as a graduate student, each Ph.D. candidate presents a written thesis proposal and a minor proposal to be defended at an oral comprehensive examination. The examination may be taken only after all course work has been completed to 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.

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.

FINANCIAL AID
Students may be funded by their advisers’ research grants, by future training grants, by department funds, or by extramural funds. Students are encouraged to obtain funding from outside sources (for example, NIH, NSF, Hughes, etc.).

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 in consultation. Fields of research open to students are decided in consultation with sponsoring faculty member.

any quarter (Staff) by arrangement

200. Physiology: Cardiovascular—Offered jointly with the Department of Medicine. Lectures, clinical presentations, and lab demonstrations of normal and disordered human cardiovascular physiology. Prerequisite: understanding of general biochemistry.

6 units, Spr (Staff) MTF 8-9:50

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) MWF 9-10:50

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, Aut (202, 1 unit; 203, 3 units; 204, 2 units) (Gastrointestinal: Lowe; Renal: Meyer, Respiratory: Raffin) MW 10-11:50, TTh 11

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) MWF 9-10:50

210. Molecular and Cellular Physiology—Required for all MCP graduate students. Core course for the principles of molecular and cellular physiology. Organized under: single cell physiologic properties, chemical and mechanical transduction, cellular colonization and polarization, and integrative physiology and homeostasis. Each general topic examines the cellular and molecular underpinnings of physiological principles leading to a greater understanding of appropriate systems physiology. Prerequisite for undergraduates, graduate students not in department, and medical students: consent of instructor.

4 units, Aut (Smith, Madison, Staff) by arrangement

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) by arrangement

215. Synaptic Transmission—Primarily for graduate students with an interest in synaptic function; interested medical students and advanced undergraduates may also 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, Win (Smith, Schwarz, Madison) TTh 3:15-4:05, discussion T 7-10 p.m.
216. Ion Channels and Membrane Physiology —
(Same as Neurobiology 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 ex-
perimental results, and critical evaluation of evi-
dence. Topics: gating mechanisms in voltage sensi-
tive and chemosensitive ion channels and ionic
mechanisms in sensory transduction. Student pre-
sentations and small group discussions.
3 units, Aut (Aldrich, Baylor) TTh 7-9 p.m.
plus section by arrangement
alternate years, not given 1995-96

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 empha-
sizes recent research developments and examines
the value of various experimental approaches for
the study of receptors.
2 units, Spr (Kobilka) Th 2:15-4:05

221. Cell Biology of Physiological Processes —
(Same as Biology 214.) Basic mechanisms of mem-
brane and cellular biogenesis in relation to physi-
ological processes. Emphasis on regulatory and
signaling mechanisms involved in coordinating
complex cellular phenomena such as cellular orga-
nization, function, and differentiation. Topics: cel-
lular compartamentalization, transport and traffic-
ing of macromolecules, organelle biogenesis, cell
division, motility and adhesion, and multicellular-
ity. Prerequisites: Biology core, Biochemistry 201.
5 units, Win (Kopito, W. Nelson) MWF 9-10:50

222. Microscopy for Biologists — (Same as Biol-
ology 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 studies and video/
digital image processing. Lectures on physical prin-
ciples; involves partial assembly and extensive use
of the instruments. Prerequisites: some college phys-
ics, Biology core.
3 units, Spr (Green, S. Smith) TTh 1:15

299. Directed Reading — Prerequisite: consent of
instructor.
any quarter (Staff) by arrangement

399. Advanced Research — Investigation sponsored
by individual faculty members undertaken by inter-
ested, qualified medical or graduate students. Re-
search fields include endocrinology, neuroendocri-
nology, and topics in molecular and cellular physi-
ology.
any quarter (Staff) by arrangement

MOLECULAR
PHARMACOLOGY

Emeriti: (Professors) Robert H. Dreisbach, Avram
Goldstein, Dora B. Goldstein
Chair: James P. Whitlock, Jr.
Professors: Terrence Blaschke (jointly with
Medicine), Helen M. Blau, Tag E. Mansour,
James P. Whitlock, Jr.
Associate Professors: Phyllis Gardner (jointly
with Medicine), Daria Mochly-Rosen, Rich-
ard A. Roth
Assistant Professors: James E. Ferrell, Jr., Garry
P. Nolan
Courtesy Professors: Kenneth Melmon, Robert
T. Schimke
Courtesy Associate Professor: Brian Hoffman
Courtesy Assistant Professor: Leslie Lenert
Consulting Professors: Gordon Ringold, Alejan-
dro 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 analy-
sis of cell signaling and gene expression.

The program leading to the Ph.D. degree in-
cludes formal and informal study in pharmacol-
ogy, biochemistry, genetics, physiology, neuro-
science, and computer science. First-year students
spend one quarter in each of three different labo-
raries, working closely with other graduate stu-
dents, a professor, and postdoctoral fellows on
various research projects. During the fourth quar-
ter, the student chooses a faculty mentor with
whom to undertake thesis research, based on avail-
able 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) MTWTh 8 F 11

**202. Pharmacology** — Continuation of 201. Topics: antimicrobial chemotherapy, cancer chemotherapy, endocrine and GI pharmacology, and toxicology.

5 units, Win (Staff) MTWTh 8 F 11

**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.


4 units, Spr (Ferrell, Staff) alternate years, not given 1995-96

**219. Scientific Communication** — Graduate students only. The techniques of scientific writing and lecturing. Students write several papers, present material orally, and evaluate the work of others with respect to clarity and efficient transfer of information.

2 units (D. Goldstein) not given 1994-95

**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) not given 1994-95

**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.

3 units (Staff) not given 1994-95

**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) ThF 12

**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) by arrangement

**299. Directed Reading**

any quarter (Staff) by arrangement

**399. Research**

any quarter (Staff) by arrangement

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**NEUROBIOLOGY**

Chair: Denis A. Baylor

Professors: Denis A. Baylor, Eric I. Knudsen, Uel J. McMahan, William T. Newsome, Howard Schulman, Eric M. Shooter, Lubert Stryer

Assistant Professor: Barbara Barres

**GRADUATE PROGRAMS**

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 fac-
ulty 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. Post-doctoral training is available to graduates holding Ph.D. or M.D. degrees, and further information is obtained directly from the faculty members 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.

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.

COURSES

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) — Prerequisite: consent of instructor.
1-18 units, any quarter (Staff) by arrangement

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 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 (Aldrich, Barres, Baylor, Knudsen, McMahan, Newsome, Schulman, Shooter, Stryer) MF 1:15-3:05
TTh 9 W 1:15-5:05

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 1995-96

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, Aut (Aldrich, Baylor) alternate years, not given 1995-96

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 1995-96

218. Neural Basis of Behavior — Advanced seminar exploring 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 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 1995-96

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 cascade; 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 1995-96

299. Directed Reading — Prerequisite: consent of instructor.
1-18 units, any quarter (Staff) by arrangement

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) T12

399. Individual Research — Prerequisite: consent of instructor.
1-18 units, any quarter (Staff) by arrangement

NEUROSCIENCES PROGRAM

**Director:** Howard Schulman (Professor of Neurobiology)

**Committee:** Helen Blau (Professor of Molecular Pharmacology), Roland Ciaramello (Professor of Psychiatry and Behavioral Sciences), Russell D. Fernald (Professor of Psychology), Rona Giffard (Assistant Professor of Anesthesia), Eric Knudsen (Professor of Neurobiology), Susan McConnell (Assistant Professor of Biological Sciences), David A. Prince (Professor of Neurobiology), Neurology and Neurological Sciences, David E. Rumelhart (Professor of Psychology), Susan McConnell (Assistant Professor of Biological Sciences), David A. Prince (Professor of Neurology and Neurological Sciences), Tom Schwarz (Assistant Professor of Molecular and Cellular Physiology), Stuart Thompson (Associate Professor of Biological Sciences), Richard Tsien (Professor of Molecular and Cellular Physiology); **Student members:** Heath Lukatch, Carolina Maier, Mollie Meffert

**Participating Faculty:**
- **Anesthesia:** Rona Giffard (Assistant Professor), Bruce Maclver (Assistant Professor), Joan E. Kendig (Professor of Biology in Anesthesia), Mervyn Maze (Associate Professor)
- **Biological Sciences:** William F. Gilly (Associate Professor), H. Craig Heller (Professor), Ron Kopito (Associate Professor), Susan McConnell (Assistant Professor), Robert Sapolsky (Associate Professor), Michael Simon (Assistant Professor), Stuart Thompson (Associate Professor)
- **Developmental Biology:** Matthew P. Scott (Professor)
- **Molecular and Cellular Physiology:** Richard Aldrich (Professor), Brian Kobilka (Assistant Professor), Richard S. Lewis (Assistant Professor), Daniel Madison (Associate Professor), Richard H. Scheller (Professor), Thomas Schwarz (Assistant Professor), Stephen Smith (Professor), Richard Tsien (Professor), Daria Mochly-Rosen (Associate Professor)
- **Molecular Pharmacology:** Helen Blau (Professor), Daria Mochly-Rosen (Associate Professor)
- **Neurobiology:** Denis A. Baylor (Professor), Barbara Barres (Assistant Professor), Eric I Knudsen (Professor), U. J. McMahan (Professor), William T. Newsome (Professor), Howard Schulman (Professor), Eric M. Shooter (Professor), Lubert Stryer (Professor)
- **Neurology and Neurological Sciences:** David A. Prince (Professor), Marion E. Smith (Professor, Research), Lawrence Steinman (Associate Professor)
- **Neurosurgery:** Gary K. Steinberg (Associate Professor)
- **Pathology:** Lawrence F. Eng (Professor, Research)
- **Psychiatry and Behavioral Sciences:** Roland D. Ciaramello (Professor), William C. Dement (Professor), Judith Ford (Associate Professor), Seymour Levine (Professor), Edith Sullivan (Associate Professor), Dona Wong (Assistant Professor)
- **Psychology:** Russell D. Fernald (Professor), John Gabrieli (Assistant Professor), David Heeger (Assistant Professor), David E. Rumelhart (Professor), Brian Wandell (Associate 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 and a living stipend. Qualified applicants should, where possible, apply for postdoctoral fellowships in open competition, especially those from the National Science Foundation and the Howard Hughes Medical Institute. January 15 is the deadline for receipt in the Neurosciences Program Office of applications with all supporting material, including a Neurosciences supplemental application. 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 worked out 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 neuroscience courses offered by several partici-
pating departments. At least one course must be taken in each of the five following categories: Clinical 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. 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.

**BIOLOGICAL SCIENCES**

158/258. Developmental Neurobiology — (Graduate students register for 258.) Lecture seminar for advanced undergraduates and graduate students. Principles of nervous system development from the molecular control of development and the role of cell-cell interactions and trophic factors, to the level of neural system and the role of experience in influencing brain structure and function. Topics: cell lineage, neurogenesis, neuronal migration, axon pathfinding and elongation, synaptic stabilization, and critical periods in development. Prerequisites: Biology 32 or equivalent; Biology 153 or Neurobiology 200, or consent of instructor.

4 units, Spr (McConnell) MWF 9-10:30 alternate years, not given 1995-96

209. Advanced Neurosciences Laboratory — (Same as Human Biology 179.) The use of equipment and techniques required to record and analyze extracellular and intracellular neural activity in vertebrates and invertebrates. In-depth training in a subset of these techniques as applied to a specific research project. Enrollment limited to 10; admission by application (available in Student Services office). Prerequisites: Biological Sciences or Human Biology core sequence and core lab (44 or equivalent). Recommended: some advanced course work in neuroscience.

4 units (Heller)

333H. Molecular Approaches to Ion Channels — Advanced treatment of the function and regulation of ion channels and molecular-level methods of study. Daily lectures and intensive lab provide working knowledge of whole cell/single channel patch clamp, voltage clamp of oocytes in conjunction with microinjection and expression of mRNA, and biochemical analysis of channel synthesis and processing.

6 units, Sum (Gilly) by arrangement

358. Developmental Neurobiology Seminar — For graduate students. The mechanisms of neurogenesis, migration, axon outgrowth, synapse formation, and synaptic plasticity during the development of the nervous system. Formatted entirely around student presentations of journal articles that report recent findings in the field. Prerequisites: Biology 158/258, consent of instructor.

1 unit, Aut, Win, Spr (McConnell) F 4

**MOLECULAR AND CELLULAR PHYSIOLOGY**

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) by arrangement

215. Synaptic Transmission — Primarily for graduate students with an interest in synaptic function; interested medical students and advanced undergraduates may also 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, Win (Smith, Schwarz, Madison)

TTh 3:15-4:05, discussion T 7-10 p.m.

**MOLECULAR PHARMACOLOGY**

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) MTWTh 8 F 11
NEUROBIOLOGY

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 (Aldrich, Barres, Baylor, Knudsen, McMahan, Newsome, Schulman, Shooter, Stryer) M 1:15-3:05, T 9, W 1:15-5:05, Th 9, F 1:15-3:05

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 1995-96

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, Aut (Aldrich, Baylor) alternate years, not given 1995-96

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 1995-96

218. Neural Basis of Behavior — Advanced seminar exploring 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 visual and auditory systems. Study of original papers, directed group discussions, and student presentations. Prerequisite: Neurobiology 200 or consent of instructor.

4 units (Knudsen, Newsome) alternate years, given 1995-96

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 cascade; 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 1995-96

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) T 12

NEUROLOGY AND NEUROLOGICAL SCIENCES

201. Clinical Neuroscience — Case demonstrations of selected disorders, discussion of the pathophysiological basis of the disorder, presentation of the basic principles underlying modern diagnostic and therapeutic management, and a discussion of recent research advances for each disease entity.

2 units, Win (Staff)

PSYCHIATRY

201. Molecular Neurobiology Seminar — For those with prior background in neurochemistry. Topics decided by students and instructor and taken from areas of current importance and activity in neurochemistry. Through judicious selection of topics and articles, it will be at the cutting edge of neuroscience and offer a unique opportunity to watch the progress of a rapidly moving field. Emphasis on critical reading and evaluation of current literature, and coherent presentation of topic material. Prerequisites: consent of instructor, Psychiatry 167 or Biochemistry 200, and Neurobiology 200.

3 units, Spr (Wong)
PSYCHOLOGY

1-3 units (Gabrieli)
*alternate years, given 1995-96

203. Perception — Topics in visual and auditory perception, emphasizing quantitative and physiological approaches.
1-3 units (Wandell)
*alternate years, given 1995-96

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 and learning and memory, and hormonal and neurochemical aspects of stress and motivation.
1-3 units, Spr (Wandell, Wine) TTh 1:15-2:30
*alternate years, not given 1995-96

228. Ion Transport and Intracellular Messengers — Ion channels, carriers, and 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: introductory course in biology or human biology, or Psychology 107.
1-3 units, Spr (Wine)

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: Psychology 141, 201, or consent of instructor.
1-3 units (Gabrieli)
*alternate years, given 1995-96

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, Win (Rumelhart) W 12-3
*alternate years, not given 1995-96

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.
1-2 units, Aut, Win, Spr (Heeger) M 4-6

PATHOLOGY

Emeriti: (Professors): Margaret E. Billingham, *Ronald F. Dorfman, Lysia K. Forno, David Glick
Chair: Klaus G. Bensch
Associate Professors: Eugene C. Butcher, Michael L. Cleary, P. Joanne Cornbleet, Steven K. H. Foung, Joseph S. Lipsick, Robert V. Rouse, Bruce R. Smoller, Raymond A. Sobel, Alan Ting
Assistant Professors: Gerald J. Berry, R. Eric Davis, Susan A. Gale, Sharon M. Geagan, Onsi W. Kamel, Teri A. Longacre, Sara A. Michie, Kent W. Nowels, Donald P. Regula, James L. Zehnder
Courtes Assistant Professor: Julie A. Neidich
Lecturer: Glen B. Haydon
Acting Assistant Professor: G. Jackson Snipes, Jeffrey L. Twiss
Visiting Associate Professor: Albert C. Yu
Clinical Professors: James L. Bennington, John T. Differding, Seth L. Haber, Paul L. Herrmann, John E. McNeal, Mahendra Ranchod
Clinical Associate Professors: Robert W. R. Archibald, Stephen S. Chen, Barbara M. Egbert, Steven Levine, Charles M. Lombard
Staff Physician and Clinical Associate Professor: Maie E. Herrick
Clinical Assistant Professors: Stephen Bell, Robert M. Cardelli, Meredith Hailes-Miller, James E. Meeker, William C. Pitts, Thomas W. Rogers, Jon C. Ross, William W. Ruehl, Charles T. Uyeda, Sharon H. Van Meter
Staff Physicians and Clinical Assistant Professors: Maritza Gonzalez, J. Matt van der Rijn

* Recalled to active duty.
PROGRAMS OF STUDY

The Department of Pathology offers a sequence of basic courses in general pathology 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, the major areas of investigation in the department include DNA replication in prokaryotes and in cultured eukaryotic cells, genomic derepression in human neoplasms, molecular cytogenetics, structure of the mitotic spindle, ultrastructural and cytochemical studies of human tumors adapted to tissue culture, purification and characterization of marker proteins and lipids that are unique to the central nervous system, immunology and genetics of the human major histocompatibility complex, developmental and cellular immunology, tumor immunology, viral leukemogenesis, fundamental studies of the AIDS virus and its effects on the immune system, and a variety of clinical-pathological studies, with particular emphasis on disease of the cardiovascular, gynecologic, and lymphoreticular systems. 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.

205. Clinical-Pathological Correlations — Correlation of clinical histories with surgical and autopsy material, including microscopy. Maximum enrollment 12, minimum 5.

206. Clinical-Pathological Correlations — Correlation of clinical histories with surgical and autopsy material, including microscopy. Maximum enrollment 12, minimum 5.

207. Principles of Electron Microscopy — Seminar on basic optics, specimen as an optical device, nature of image contrast, image detection and interpretation, related photographic principles, specimen preparation and requirements, fixation, embedding, microtomy, staining, and some special techniques.

1 unit, Aut, Win, Spr (Haydon) by arrangement

208. Interpretation of Electron Micrographs — Seminar on principles of electron optical image formation as applied to the interpretation of biological ultrastructure. Development of the wave mechanical description of the various sources of contrast in the electron microscope image.

1 unit, Spr (Haydon) by arrangement

213. Gross Autopsy Pathology Laboratory — Students examine and discuss unfixed dissected organs from current autopsies and correlate morphologic findings with the clinical history. Students may view postmortem examinations and (alone or in a small group), for an extra unit, participate in one postmortem examination with the assistance of residents and staff, and present the case to class. Class time scheduled by consensus at first meeting (listed below). Prerequisite: currently taking or previously completed 230B or C.

2-3 units, Aut, Win (Regula, Staff) F 12:30

220. Immunology — (Same as Microbiology and Immunology 200.) Principally for medical and graduate students but may be taken by advanced undergraduates. Immunology as related to medicine is emphasized. Prerequisites: basic principles of genetics and introductory courses in biochemistry (equivalent to 200-201) and histology.

3 units, Spr (Weissman, McDevitt, Goodnow) MWF 10

220A. Problem Solving in Immunology — (Same as Microbiology and Immunology 200A.) Provides direct experience in understanding immunology using problems. Three to five problems are corrected and discussed weekly. Corequisite: 220 or Microbiology and Immunology 200.

1 unit, Spr (Weissman, McDevitt, Goodnow) by arrangement

230A,B,C. General and Special Pathology — Three-quarter introduction to general 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) MWF 1:15-3:15

230B. Special Pathology
6 units, Aut (Regula, Lombard, Staff) MW 11-12, TTh 9-11

230C. Special Pathology
6 units, Win (Regula, Hendrickson, Horoupian, Staff) MW 11-12, TTh 9-11

281. Practical Introduction to Electron Microscopic Techniques — Lab providing, through tutorial direction in the completion of two products, basic familiarity with the major technical problems encountered in the preparation of biological material for electron microscopy. Prerequisite: basic understanding of electron microscopy.
1-4 units, Aut, Win, Spr (Haydon)
by arrangement

290. Research in Experimental Neuro-Pathology — Introduction to research methods in experimental neuropathology for students interested in a long-term project in this area. Participation in neuropathology 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 — (Same as Biology 205.) 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: Biology 31, 118, and 119, or consent of instructor.
3 units (Hanawalt)
alternate years, not given 1995-96

299. Directed Reading — Prerequisite: consent of faculty member.
1-18 units, any quarter (Staff) by arrangement

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) by arrangement

RADIATION ONCOLOGY

Emeriti: Malcolm A. Bagshaw, Peter Fessenden, George M. Hahn, Robert F. Kallman, Clarence J. Karzmark, Kendric Smith
Chair: Richard T. Hoppe
Associate Professor: Steven L. Hancock
Assistant Professors: Susan J. Knox, Joseph C. Poen, Melanie C. Smitt
Assistant Professor (Research): Amato J. Giaccia

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; effects of heat, drugs, and radiation on the killing and repair of mammalian cells both in vitro and in vivo; studies of genes induced by ionizing radiation and by hypoxia; 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 new hypoxic cytotoxic agent (tirapazamine).

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) by arrangement
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) Th 8

Three-quarter course covering cancer cell biology, carcinogenesis, and fundamental principles of therapy. Comprehensive view of major, relevant scientific bases, and advances in areas directly relating to understanding and control of neoplastic growth. Organized and coordinated by Professor Brown.
3 units (Staff) alternate years, given 1995-96

299. Directed Reading
any quarter (Staff) by arrangement

399. Research
any quarter (Staff) by arrangement

RADIOLOGY

Chair: Gary M. Glazer
Associate Professors: Robert J. Herfkens, Michael E. Moseley, Norbert J. Pelc, F. Graham Sommer, Stuart W. Young
Assistant Professors: Ann C. Bergman, Michael Dake, John Drace, Debra M. Ikeda, Elvira V. Lang, Ann N. C. Leung, King C. P. Li, Michael Marks, Sandy A. Napel, Geoffrey D. Rubin, George Segall, Charles P. Semba, Daniel M. Spielman
Professor (Clinical): Bruce R. Parker
Associate Professors (Clinical): Richard A. Barth, Barton Lane, Robert E. Mindelzun, Matilde Nino-Murcia

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) by arrangement

208. Experimental Nuclear Medicine — Computer applications in medicine, particularly use of radioisotopes as tracers. Recommended: some knowledge of physiology and calculus.
 Spr (Goris) by arrangement

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.
 I unit (Jones, Staff)

299. Research
any quarter (Staff) by arrangement

SURGERY

The following Anatomy courses are open to undergraduates. For graduate and Medical School course offerings, see the Stanford University bulletin School of Medicine.

COURSES

101. A Regional Study of Human Structure —
The morphology of the trunk and extremities. Lectures in regional anatomy, dissection of the human body, and student presentations. Goal is to learn the anatomy of the area through the dissection process, and to present this information to each other during the presentation period. Enrollment limited to 32.
7 units, Win (Dolph, Glasgow) MWF 1:15-5:05

101A. A Regional Study of Human Structure —
Covers the head and neck portion of the cadaver. Lectures followed by head and neck dissection. Enrollment limited to 32.
5 units, Spr (Dolph) TTh 1:15-5:05
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: George G. Dekker

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 Center for Chicano Research
Stanford Center for Organizations Research
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.

STANFORD CENTER FOR CHICANO RESEARCH

Director: Luis R. Fraga
Associate Director: Charlene Aguilar
Fellows: 26 affiliated faculty

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. Research projects examine a variety of 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.

CENTER FOR ECONOMIC POLICY RESEARCH

Director: Gavin Wright
Deputy Director: Ed Steinmueller

The primary mission of the Center for Economic Policy Research (CEPR) is to encourage and support research on economic policy issues of lasting importance. CEPR pursues four inter-related 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 individuals from most schools and many departments. 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.

CEPR conducts workshops, conferences, and other events designed to improve the flow of economic policy information among people with diverse institutional and professional backgrounds. It also publishes a newsletter available to members of the Stanford community on request.

CEPR does not offer courses for academic credit, admit students, or award degrees.
EDWARD L. GINZTON LABORATORY

Director: Gordon S. Kino
Associate Director: Marilyne A. Elverson
Assistant Professor: Connie Chang-Hasnain (Electrical Engineering)
Professor (Research): B. T. Khuri-Yakub (Electrical Engineering)
Associate Professor (Research): Martin M. Fejer (Applied Physics)
Visiting Associate Professor: Byoung Y. Kim (Electrical Engineering)

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, high temperature superconductors, laser physics, mesoscopic devices, picosecond optical electronics, squeezed light, scanning optical microscopy, and tunneling and force microscopy.

W. W. HANSEN EXPERIMENTAL PHYSICS LABORATORY (HEPL)

Director: Mason R. Yearian
Associate Director: Robert A. Farnsworth
Assistant Director: Robin J. Maslin

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, and low temperature physics.

STANFORD HUMANITIES CENTER

Director: Wanda M. Corn
Associate Director: Charles Junkerman

The Stanford Humanities Center promotes humanistic research and education at Stanford and nationally. Its programs include (1) fellowships for advanced research by faculty (from Stanford and other institutions) and by Stanford graduate students; and (2) public presentation, through lectures, colloquia, conferences, and publications, of new work in the humanities, especially work of an interdisciplinary nature.

The center provides fellowships for Stanford faculty (internal fellows), faculty from other universities (external fellows), and advanced Stanford graduate students. All fellows are in residence during the academic year and meet regularly.

Faculty fellows, selected on the basis of an open competition, pursue their own research and contribute to the intellectual life of the Stanford community by giving department courses or by leading other activities. The courses given by fellows in 1994-95 are shown below:
### Courses

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<th>Department</th>
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<td>The Culture of High Modernism, 1897-1913</td>
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<td>270/370</td>
<td>Undergraduate/Graduate Colloquium: State Punishment and Cultural Deviancy in America</td>
<td>4-5</td>
<td>Win (Cummins)</td>
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<td>275S</td>
<td>Undergraduate Research Seminar: Science and High Technology in Silicon Valley, 1930-1980</td>
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<td>Win (Lenoir)</td>
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<td>LAW</td>
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<td>SLAVIC LANGUAGES AND LITERATURES</td>
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<td>Dostoevsky</td>
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<td>Contemporary Central American Narrative and Testimonial Literature</td>
<td>3-5</td>
<td>Win (Arias)</td>
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</table>

### The Institute for International Studies (IIS)

**Director:** Walter P. Falcon  
**Deputy Director:** Coit Blacker  
**Associate Directors:** Brigitte Carnochan (External Affairs), Nancy E. Okimoto (Academic Affairs)

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 European Studies, the Center for International Security and Arms Control, the Forum on Sovereignty and Governance, the Global Environment Program, and the North America Forum. IIS also administers overseas research centers in Kyoto, Japan and Chiapas, Mexico, and, on behalf of two consortia of major universities, administers advanced language study programs in Taipei, Taiwan and Yokohama, Japan.

In the areas of public service and outreach, IIS administers three interrelated programs which develop internationally oriented curricula for use by public school teachers and provide staff development opportunities for precolligate educators interested in other cultures, world regions, international systems, and foreign languages. Curricular development projects on Africa, China, Japan, Latin America, the former Soviet Union and Eastern Europe, and Western Europe are organized within the Stanford Program on International and Cross-Cultural Education (SPICE). The Bay Area Global Education Project (BAGEP) and the Bay Area Foreign Language Project (BAFLP) provide staff development activities for precolligate teachers in the Bay Area.

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 415-723-4581. For more information about particular IIS programs, contact the programs directly (area code 415):

Asia/Pacific Research Center, 723-9741
Bay Area Global Educators Project (BAGEP)/Bay Area Foreign Language Project (BAFLP), 725-1482
Center for European Studies, 723-9593
Center for International Security and Arms Control, 723-9725
Forum on Sovereignty and Governance, 723-4581
Global Environmental Program, 725-9888
Inter-university Center for Japanese Language Studies, 725-1490
Inter-university Program for Chinese Language Studies in Taipei, 725-2575
North America Forum, 723-3096
Stanford Japan Center—Research, 725-1491
Stanford Program on International and Cross-Cultural Education (SPICE), 725-1485

UNDERGRADUATE PROGRAMS

INTERSCHOOL HONORS PROGRAM IN ENVIRONMENTAL SCIENCE, TECHNOLOGY, AND POLICY

The institute coordinates a university-wide inter-school 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 Environmental Program, 200 Encina Hall, telephone 415-725-9888.
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 415-723-3084.

**CENTER FOR MATERIALS RESEARCH (CMR)**

*Director:* M. R. Beasley  
*Deputy Director:* H. C. Andersen  
*Technical Director:* T. M. Gur

*Affiliated Faculty:* (currently 78 members from the following departments and laboratories):
- Aeronautics and Astronautics
- Applied Physics
- Chemical Engineering
- Civil Engineering
- Electrical Engineering
- Geological and Environmental Sciences
- Materials Science and Engineering
- Mechanical Engineering
- Physics
- Hansen Laboratories
- Stanford Synchrotron Radiation Laboratory

CMR, located in McCullough Building, is one of nine university labs in the U.S. supported by the Division of Materials Research of the National Science Foundation under its Materials Research Science and Engineering Center (MRSEC) program.

The purpose of MRSEC is to support major central research facilities, to provide seed money for funding junior faculty and initial funding for established faculty who are changing research fields, and to support interdisciplinary research groups (IRGs) requiring expertise in two or more materials-related disciplines.

To fulfill these goals, CMR operates extensive materials characterization facilities and, at the present time, sponsors eleven summer programs for undergraduates; nine programs for women; eight seed programs; eight programs for minorities; and five multi-investigator, multidiscipline IRG programs. CMR’s professional staff also conduct research in areas related to advanced materials synthesis and characterization.

The purpose of the Stanford Center for Organizations Research (SCOR) is to advance knowledge of the structure and functioning of organizations in modern society through support of both basic and applied research; and to provide education and training opportunities for students at all levels — undergraduate, graduate, postgraduate, and visiting scholars.

SCOR was formally established by the University in 1988, but did not become an independent research center until 1993. Approximately 85 faculty members, drawn from six schools (Business, Education, Engineering, Humanities and Science, Law, and Medicine) serve as faculty affiliates to the center. SCOR is governed by a faculty steering committee and is also guided by a graduate student steering committee.

SCOR’s main emphasis to date has been on developing programs to stimulate and strengthen interdisciplinary and interuniversity research and research training on organizations. Specific activities in service of these objectives include:
- Developing forums for the discussion of research issues and methods (for example, conferences, colloquia, seminars).
- Devising and sponsoring new approaches to research training (for example, intensive workshops focused on specific research skills).
- Developing more effective ties with other organization research centers (for example, the creation in 1990 of the Consortium of Centers for Organizations Research).
- Providing support for visiting scholars from other universities, over half of whom have been scholars drawn from foreign countries.

SCOR does not offer courses for academic credit, admit students, or award degrees. Rather, it functions to supplement and support activities of existing schools and departments.

SCOR is located in the Graduate School of Business, room 223, telephone 415-725-2130.

**INSTITUTE FOR RESEARCH ON WOMEN AND GENDER**

*Director:* Iris F. Litt (Professor, Pediatrics)  
*Associate Director:* Sherri Matteo

During the last decade, research on women and gender has had a profound effect on the social 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.

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**HOOVER INSTITUTION ON WAR, REVOLUTION AND PEACE**

**Director:** John Raisian  
**Deputy Director:** Charles G. Palm  
**Associate Directors:** Gerald A. Dorfman, John C. Hays, Thomas H. Henriksen, Richard Sousa  
**Acting Budget and Finance Officer:** Claudia Hubbard  
**Public Affairs Manager:** Gloria J. Walker  
**Staff Affairs Officer:** Helen M. Corrales  
**Honorary Fellows:** Ronald W. Reagan, Alexander Solzhenitsyn, Margaret Thatcher  
**Distinguished Fellow:** George P. Shultz  
**Distinguished Visiting Fellow:** Yuan-li Wu  
**Executive Secretary of National, Peace, and Public Affairs Fellows Program:** Thomas H. Henriksen  
**Distinguished Visiting Fellows:** Jack Kemp, Edwin Meese III, Abraham D. Sofaer

Notable long-term research in international studies includes the study of transitions to democracy and free markets, as regimes in Africa, Asia, Central and Eastern Europe, the Commonwealth of Independent States, and Latin America experiment with democratic institutions and processes and 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 study of international rivalries and global cooperation, including 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 is on improving 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.

Director: Burton Richter
Deputy Director: Sidney D. Drell
Executive Officer of the Faculty: Martin Perl
Associate Directors: Arthur I. Bienenstock (SSRL Division), Jerry L. Jobe (Business Services Division), David W. G. S. Leith (Research Division), J. M. Paterson (Technical Division)


Associate Professors: Lance Dixon, Thomas M. Himel, Ronald D. Ruth, Rafe H. Schindler
Assistant Professors: JoAnne L. Hewett, David Whittum


The Stanford Linear Accelerator Center (SLAC) 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, Graduate Student Adviser.

Director: Arthur I. Bienenstock
Deputy Associate Director: Herman Winick
Assistant Directors: Massimo Cornacchia, Ronald A. Gould, Keith O. Hodgson, Piero A. Pianetta


Associate Professor: Alice P. Gast
Assistant Professor: Zhi-Xun Shen

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, Geology, Material Science and Engineering, and Physics.

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.
Vice Provost and Dean, Libraries and Information Resources: Robert L. Street

Libraries and Information Resources (L&IR) is responsible for the University Libraries, for campus-wide academic and administrative computing, and for computer networking and telecommunications. Under the Vice Provost's guidance, L&IR provides the support services necessary to maintain and promote Stanford's leadership in these areas. L&IR also provides library services, facilitates the acquisition and availability of computing hardware and software, supplies communications paths and links, and develops computing and communications expertise. It also offers consultation and advice for planning, development, and use of both library information and information technology. It furnishes training and support for faculty, staff, and students who use information technology and/or the libraries.

L&IR has three divisions: Stanford University Libraries (SUL), Networking and Communication Systems (N&CS), and the Stanford Data Center.

ACADEMIC COMPUTING SERVICES (ACS)

During Autumn, Winter, and Spring Quarters, ACS offers short, noncredit introductory classes about using L&IR's Distributed UNIX Systems. Schedules for the classes are found in the document racks on the second floor of Sweet Hall. The Stanford Data Center offers other noncredit classes in computing. See the "Computer Science" section of this bulletin for programming classes for credit.

COURSES

The following courses are offered Autumn, Winter, and Spring for 0 units.

EMACS Introduction — Introduction to EMACS, the screen-oriented text editor on L&IR’s Distributed UNIX Systems.

Macintosh Cluster at Tresidder: Introduction — For those with little or no previous Macintosh experience. Overview of hardware and basic operations (initializing diskettes, selecting icons, creating folders, and opening and closing applications and files). Macintosh cluster policies and introduction of file servers. Accelerated class assumes prior knowledge equivalent to that of the beginning course; it covers materials specific to the Macintosh cluster (file and printing services, electronic mail services, and the cluster's priority system).

UNIX™ Introduction: Part I — Instruction on how to use the UNIX operating system that runs on L&IR's Distributed UNIX Systems. Topics: opening an account, logging in and out, features of the UNIX file system, useful utilities, creating and editing files, and running applications.

UNIX™ Introduction: Part II — Instruction on how to control and customize the UNIX environment. Customize .login and .cshrc files and shell environment variables. Job control and the security system. Prerequisite: experience using UNIX or Introduction to UNIX: Part I.

Introduction to Electronic Mail — Introduction to Elm and other electronic mail programs available on L&IR's Distributed UNIX Systems. Recommended: master the basics taught in a UNIX class.

Introduction to Newsgroups — Introduction to the UNIX based news service. Demonstrates the process of reading and submitting news articles.

NETWORKING AND COMMUNICATION SYSTEMS (N&CS)

Director: William H. Yundt

Networking and Communication Systems (N&CS) supports data, video, and voice communication for Stanford. This division operates the campus telephone system and SUNet, the University-wide computer and video network. It also provides computing resources used by faculty and students for instruction and unsponsored research and distributes UNIX operating systems for campus users. N&CS offers support for local network administrators and UNIX system administrators. N&CS also offers seminars, publications, videotaped courses, hardware, and software that allow access to SUNet services, network consulting services, evaluations of networking products, supercomputing support, applications software licensing, and the Academic Data Service. For more information, contact Networking and Communication Systems at 415-723-3909 or via electronic mail at help@networking.
N&CS also operates L&IR's Distributed UNIX Systems including the workstations in Sweet Hall and a DEC 5500 computer. Stanford students and faculty can use the computers for electronic mail and other purposes of instruction and unsponsored research. Personal and commercial use unrelated to instruction and research are generally prohibited. Users receive allocations of computer resources in proportion to their course work and research needs. These UNIX systems offer interactive services including: text editors; statistical packages such as SAS and SPSS; and programming languages such as Pascal, FORTRAN, C, and Common Lisp. Handouts that include information about opening an account, logging on, and using these systems are found in the document racks on the second floor of Sweet Hall. For more information about L&IR's Distributed UNIX Systems, contact the Sweet Hall consultants at 415-725-2101 or via electronic mail at consult@leland.

STANFORD DATA CENTER

**Director:** John R. Sack

Stanford Data Center supports the institutional processes of the University and the hospital by providing them with highly reliable data processing and centralized and decentralized printing technologies. The center supports local systems, offering consultation services and services based on the Data Center's mainframe computer, helping departments and programs to effectively acquire, develop, and use these technologies for managing information. The Data Center also handles all campus mail services. Supercomputing services are offered to clients at reduced rates through a faculty review committee.

In Forsythe Hall, the center operates an IBM ES9000 and provides machine and staff services to the Stanford community. The center also maintains connections for Stanford to national networks such as Telenet, BITNET, and Internet.

Computer-based services include: screen text editing (WYLBUR) and formatting (SCRIPT) programs for preparing reports, letters, data, and theses; SPIRES, the Stanford-developed database management system; Prism, the on-line collection of Stanford administrative files and services; and Folio, a system that provides on-line access to Stanford's academic and institutional data resources such as Socrates, the on-line library catalog, and a series of index and citation databases.

The Data Center has an extensive master library of application-specific computer routines encompassing statistical, data analysis, and other data processing functions, including SAS® and SPSS-X®. Programming languages for use in interactive and/or batch mode include Assembler H, COBOL, FORTRAN, Pascal, and PL/I. Other software packages that run under the IBM MVSESA operating system are also available. Other services include high-speed page printers, support for local laser printers, CONTACT/EMS™ (an electronic mail handling system), and micromainframe linkage using the Samson™ file transfer software.

**COURSES**

Courses and seminars are designed to help clients learn to use the facilities and services independently. Courses are noncredit but require registration. They include introductory and advanced courses in the use of computers (including microcomputers) for functions such as text editing and information retrieval. Microcomputer courses generally carry a fee; other mainframe courses are free. Complete course descriptions and schedules may be found on-line in the Prism file TRAINING SCHEDULE. To see the schedule, take the following steps:
1. Establish your connection to the Forsythe computer.
2. If you have a Forsythe account, log on to your account, and then enter PRISM SELECT TRAINING SCHEDULE at the Command> prompt. If you do not have a Forsythe account, enter PRISM at the Account? prompt, enter your name and PIN, and then enter SELECT TRAINING SCHEDULE at the prompt.
3. Follow the on-line instructions. If you need help at any point, enter HELP at the prompt.

The schedule may also be found in the "Training Opportunities for the Stanford Community" course catalog, which is printed quarterly in the Campus Report. Copies are available in the racks located in the Forsythe Hall lobby. For further information, contact the Data Center Instructional Program at 415-723-4391 or SDC.Training@Forsythe.

STANFORD UNIVERSITY LIBRARIES

**Director of Libraries:** Michael A. Keller

**Director of Technical Services:** Cynthia I. Gozzi

**Director of Academic Information Services:** Karen Nagy

**Director of Library Collections:** Anthony Angiletta

**Library Development Officer:** Emily Hernandez

**Emeriti:** William P. Allan (Curator for English and American Literature), M. Celeste Ashley (Drama Librarian), Alan Baldridge (Miller
Curators — Honorary: W. Conyers Herring (Physics Collection), William R. Moran (Archive of Recorded Sound), Margaret C. Sowers (Map Collections), Charles J. Tanenbaum (Exhibits)

The Stanford University Libraries sponsor educational activities that promote awareness of its resources and instruct patrons in their effective use. All the major library units provide some educational activities; the J. Henry Meyer Memorial Library places particular emphasis on media and services in support of the curriculum of the University and of the Continuing Studies Program.

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 libraries provide workshops each quarter that instruct patrons on the use of Socrates, the on-line catalog. Instructional support is provided at the libraries' microcomputer clusters, audiovisual facility, and language lab.


The Research and Instructional Technologies Support (RITS) group supports and enhances instruction and research by providing library and computing services and resources. 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 and Tresidder Union.

The Academic Software Development group develops applications and tools that assist Stanford faculty in performing their instruction and research.

For more information regarding services in these areas, consult "About Computing at Stanford: A Guide for Faculty and Students."

Cecil H. Green Library

Cecil H. Green Library maintains research collections in the social sciences and humanities. These collections, which number 2.3 million volumes, are now housed in two locations: the stack area of the Green Library and the Stanford Auxiliary Library. During regular academic ses-
sions, 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 inter-session 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 West Wing is the former Main Library facing the Quadrangle and is currently closed for repairs from damage sustained in the 1989 Loma Prieta earthquake; and the South Stack consists of the two basement floors of the Meyer Library. 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; and 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.

**J. HENRY MEYER MEMORIAL LIBRARY**

The J. Henry Meyer Memorial Library is the media and instructional support library for Stanford University. Meyer's collections and services are designed to meet many of the initial research needs of Stanford students and the teaching support needs of faculty. In addition, Meyer houses the University's language laboratory, a computer classroom, a computer cluster, and a new 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.


**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** — Primarily for art history graduate students; junior or senior undergraduate majors who plan to continue in art history on the graduate level may enroll with consent of instructor. Introduction to reference works and library techniques essential to the study of art and architectural history. Sources of artistic, historical, and cultural information in their printed and automated forms.
  - 4 units (Ross) alternate years, given 1995-96

- **Latin American Studies 260. Latin American Bibliography** — Introduction to research use of Stanford library collections on Latin American topics.
  - 3 units, Aut (Trujillo) T 10:15-11:45

- **Music 200. Graduate Proseminar** — Required of first-year graduate students in music. Introduction to research in music, bibliographical materials, major issues in the field, and philosophy and methods in music history. Guest lecturers and individual research topics.
  - 4 units, Aut (Berger, Nagy)

- **Slavic Languages 200A. Introduction to Slavic Bibliography** — Open to undergraduate and graduate students. Introduces students to library's bibliographic and book resources, reference sources in English and Western languages, and provides a historical and critical analysis of Slavic bibliographic and reference tools and search methodology. Final bibliography project required. Knowledge of a Slavic language is required for Slavic students registered for 3 units, others register for 1 unit.
  - 1 or 3 units, Aut (Zalewski) W 3:15-5:05
HOOVER INSTITUTION ON WAR, REVOLUTION AND PEACE

Deputy Director: Charles G. Palm
Head Librarian: Judith Fortson
Cataloging Head: Paul Thomas
Acquisitions/Serials Head: Viveca Seymour
Preservation Services Head: Maria Grandinette
Africa and Middle East Collection—Stella and Ira Lillick Curator: Peter J. Duignan; Deputy Curators: Karen Fung, Edward A. Jajko
British Labor Collection—Honorary Curator: Peter Stansky
Central and West European Collection—Curator: Lewis H. Gann

East Asian Collection—Curator: Ramon H. Myers; Deputy Curator: Mark Tam
East Central Europe Collection—Curator: Maciej Sierkierski
Hanna Education Collection—Curator: Gerald A. Dorfman
Hoover Institution Archives—Archivist: Anne Van Camp
Latin and North American Collections—Curator: William E. Ratliff
Russian and Commonwealth of Independent States Collection—Curator: Robert Conquest; Deputy Curator: Joseph D. Dwyer

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.
The Graduate Special Program is designed for students who have demonstrated outstanding academic performance in a doctoral program at Stanford and who are interested in an interdisciplinary Ph.D. degree that cannot reasonably be completed in an existing graduate department or interdisciplinary program. It is administered by the Committee on Graduate Studies (C-GS) through a standing subcommittee appointed by the C-GS chair, which reviews proposals and makes recommendations on admission to C-GS.

The normal eligibility criteria for application to the Graduate Special Program are:

1. Completion of a minimum of two quarters in a Stanford doctoral level program.
2. Completion of no more than three years of graduate study at Stanford.
3. Completion of all department or program requirements (including qualifying examinations and required GPA) if applicable, that normally would be completed within the time that the applicant has been enrolled in the primary graduate degree program. The application must also specify a formal Ph.D. qualifying procedure for the Graduate Special Program that is acceptable to the faculty members on the student's proposed supervisory committee and to the Graduate Special Subcommittee.
4. a) If the applicant is beyond the second year of study in a Ph.D. or Ed.D. program, admission to candidacy is required before the Graduate Special application is accepted.
   b) Students in an M.D. or J.D. program may apply only if they wish to obtain the Graduate Special Ph.D. in addition to the graduate degree that originally brought them to Stanford.
5. Any exceptions to the above eligibility requirements must be approved by C-GS.

The applicant is responsible for obtaining the agreement of at least four faculty members to serve on a supervisory committee. The principal adviser must be an Academic Council member, and at least two of the committee members must be tenured faculty. In accordance with the nature of the program, members of the committee should represent at least two departments of the University.

The deadline for applications is the second week of the quarter in which review is requested. The application must include a succinct statement of the dissertation topic describing and justifying the field of inquiry, its interdisciplinary nature, and why it cannot be completed within an existing department or program. A title for the program should be selected that does not include the name of any department or graduate program at Stanford. The applicant should also describe his or her preparation in the subjects relevant to the proposal and the reasons for wishing to pursue the field of inquiry.

If the proposal is approved, the student submits a Graduate Program Authorization Petition and enrolls as a Graduate Special doctoral student in the field designated on the proposal. Any subsequent changes in the program or the composition of the supervisory committee must be approved by the Graduate Special Subcommittee.

Each student in a Graduate Special program must have the agreement of a graduate department or program to provide the administrative support and services normally available to its doctoral students. This department is usually the student's previous department or that of the principal adviser. The home department is not obliged to provide financial support or to monitor academic progress.

Students registering for special research under the guidance of their committee or for the Ph.D. dissertation should use the following course numbers:

**COURSES**

400. Research  
*by arrangement*

401. Ph.D. Dissertation  
*by arrangement*

501. Special Summer Course  
1 unit, Sum (Staff) *by arrangement*
THE CONTINUING STUDIES PROGRAM

Dean: Marsh McCall
Associate Dean and Administrative Director: Jeffrey H. Wachtel

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 415-725-2650.

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 415-723-3109 or fax their request for a copy of the Stanford University bulletin, Summer at Stanford to 415-725-4248, or write to the Summer Session Office, Building 590, Stanford University, Stanford, California 94305-3005. This bulletin includes 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 multicultural environment. 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 and Dean 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 Office; Bechtel International Center; the Office of the Multicultural Educator, Lesbian, Gay, and Bisexual Community Center; Women’s Center; Disability Resource Center (DRC); and Tresidder Memorial Union, including the Office of Student Activities and 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 room 323, Old Union, telephone 415-723-2733. Students are welcome in that office to discuss ideas, personal issues, or general concerns about student life.

The Dean of Students also works closely with the Residence Deans, who are supervised by Residential Education. Residence Deans provide assistance to on- and off-campus students. They can advise students about academic and personal matters, occasionally intervene directly in behavior 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 are assigned to specific residences and to off-campus students; for further information, call the Office of the Dean of Students, 723-2733.

DISABILITY RESOURCE CENTER (DRC)

The Disability Resource Center provides information, referrals, and services for students and other community members with physical and learning disabilities. A number of support services are available for students with long-term disabilities or illnesses, as well as those with short-term disabling conditions. Services include recorded text, class notes, sign language or oral interpreting, braille writing, and accessible transportation. Additionally, services for students with learning disabilities include referral for educational diagnostic testing, advocacy, peer support, and specialized tutoring. A variety of assistive equipment, such as wheelchairs, TDDs, and specialized computers, is also available for loan or public use. The DRC’s library contains updated information ranging from scholarships to accessible travel, and the staff can assist in access arrangements with the University’s departments and community support agencies.

Access Stanford, a guide to University resources for students with disabilities, is available in print, large print, braille, or cassette tape. For more information, call the DRC at 415-723-1066 (voice) or 723-1067 (TDD). 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.

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 counsel-
ting 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 international 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), Office of Student Activities (OSA), and the undergraduate Department of Computer Science and the Macintosh clusters.

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 415-723-3384.

VOLUNTARY 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 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, and in order to advocate publicly a position on a public issue, all voluntary organizations must register with the University through the Office of Student Activities (OSA) on the second floor of Tresidder Memorial Union.

As conditions of registration, each voluntary 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 mem-
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 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.

A voluntary organization that is registered with the University may use University facilities for meetings open to more than its own members and to specifically invited guests, subject to the regulations of the Committee on Public Events. Contact Nonacademic Facilities Scheduling, the Registrar's Office, B8, Old Union, for further information about nonacademic room scheduling.

A voluntary religious organization may hold open meetings only with the approval of the Office of the Dean of the Chapel.

A registered voluntary 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 voluntary 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, and Buddhism at Stanford. The larger worship gatherings are the Shabbat services and dinners on Fridays at 6:30 p.m. 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 in Memorial Church.

The University's commitment to the process by which convictions and values are defined and sharpened is manifest in its support of the diverse religious groups on campus and its maintenance of the Chaplaincy staff of Memorial Church. 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 Stanford Associated Ministries 415-723-3114, or the Memorial Church 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."

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 cochair, chosen by the President, who presides over all cases except those involving Honor Code violations; and a student cochair, 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 President 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 President 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, 323 Old Union, 415-723-9610.

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."

INTERPRETATION: FREE EXPRESSION AND DISCRIMINATORY HARASSMENT

Effective June 1990, the following interpretation was a response to incidents on campus in recent years that revealed doubt and disagreement about what the Fundamental Standard means for students in the sensitive area where the right of free expression can conflict with the right to be free of invidious discrimination. It is offered by the Student Conduct Legislative Council to provide students and administrators with guidance in this area. For further information about the purpose and scope of this interpretation, see "Comments on the Fundamental Standard Interpretation: Free Expression and Discriminatory Harassment," available from the Office of Judicial Affairs.

1. Stanford is committed to the principle of free inquiry and free expression. Students have the right to hold and vigorously defend and promote their opinions, entering them into the life of the University, there to flourish or wither according to their merits. Respect for this right requires that students tolerate even expression of opinions which they find abhorrent. Intimidation of students by other students in their exercise of this right, by violence or threat of violence, is therefore considered to be a violation of the Fundamental Standard.

2. Stanford is also committed to principles of equal opportunity and nondiscrimination. Each student has the right of equal access to a Stanford education, without discrimination on the basis of sex, race, color, handicap, religion, sexual orientation, or national and ethnic origin. Harassment of students on the basis of any of these characteristics contributes to a hostile environment that makes access to education for those subjected to it less than equal. Such discriminatory harassment is therefore considered to be a violation of the Fundamental Standard.

3. This interpretation of the Fundamental Standard is intended to clarify the point at which protected free expression ends and prohibited discriminatory harassment begins. Prohibited harassment includes discriminatory intimidation by threats of violence, and also includes personal vilification of students on the basis of their sex, race, color, handicap, religion, sexual orientation, or national and ethnic origin.

4. Speech or other expression constitutes harassment by personal vilification if it:
   a) is intended to insult or stigmatize an individual or a small number of individuals on the basis of their sex, race, color, handicap, religion, sexual orientation, or national and ethnic origin; and
   b) is addressed directly to the individual or individuals whom it insults or stigmatizes; and
   c) makes use of insulting or "fighting" words or nonverbal symbols.

In the context of discriminatory harassment by personal vilification, insulting or "fighting" words or nonverbal symbols are those "which by their very utterance inflict injury or tend to incite to an immediate breach of the peace," and which are commonly understood to convey direct and visceral hatred or contempt for human beings on the basis of their sex, race, color, handicap, religion, sexual orientation, or national and ethnic origin.
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 Credit" for the class in which the violation occurred, 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 Credit," 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 Dean of 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 monetary fine
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**

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 Dean of 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 Dean of 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 Dean of Student Affairs shall, upon application by the student, postpone payment of any fine when in the Dean’s judgment it appears necessary to avoid undue financial hardship. In no event, however, shall a University degree be awarded until that student has paid the full amount due.

       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 Dean of Student Affairs for use in assisting students who are in need of financial help.

       b) A fine can be ordered paid to the Dean of 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 Dean of Student Affairs shall, upon application by the student, postpone the time that the work must be completed when, in the dean’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 Dean of Student Affairs shall determine if and when the work has been satisfactorily completed. If the dean 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 President of the University 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
- Job Connection Day in Spring Quarter
- Job listings
- Odyssey, the internship database
- On-Campus Recruiting Program
- Public Service and the Arts Career Faire in Winter Quarter
- Reference file service
- Resource library, which includes books, periodicals, handouts, and audio/videotapes
- Stanford Career Faire in Autumn Quarter
- Workshops on how to get started at the CPPC, interviewing, internships, and the job search process
- Internship information and stop-out advising for students who wish to take time out from their regular academic program, as well as part-time and summer employment opportunities, are also available at the CPPC. Check the Friday Stanford Daily or the CPPC bulletin board 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: 415-723-3963.

CENTER FOR TEACHING AND LEARNING (CTL)*

Director: Michele Marincovich

The Center for Teaching and Learning serves two groups: undergraduate and graduate students seeking to improve how they learn, and teaching assistants and faculty seeking to improve how they teach.

SERVICES TO UNDERGRADUATES AND GRADUATES

CTL provides a wide range of resources for students who want to modify their study habits 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, by filling out a request form at CTL; usually a tutor will be assigned by the next day. Students interested in, and qualified for, tutoring others can take CTL's courses in tutoring techniques.

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: 415-723-1326.

SERVICES TO FACULTY 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, and expand awareness of the role of teaching at research universities and increase its rewards.

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 723-1326.

COURSES

Workbooks, detailed syllabi, sample videos, and complete sets of evaluations for most CTL courses are available in room 115, Sweet Hall.

10. Self-Coaching and Continuous Improvement — To achieve their potential, individuals must be able to improve slowly but steadily — without crises and without external coaching. Adopting a self-coaching strategy is the key, a strategy that emphasizes self-motivation, self-observation, analysis, and a willingness to experiment.

1 unit, Aut, Win (Matthies)

11. Accelerated Concept Mastery — 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, Win (Matthies)

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, Spr (Matthies)

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, Spr (Matthies)

41. Reading Smarter — In addition to relying on various high-speed gears, 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, Spr (Matthies)

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 groups depend on non-superficial forms of collaboration.

2 units, Aut, Win, Spr (Matthies)

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 differentiating between academic and intellectual motivation.

3 units, Sum (Staff)

118. Public Speaking — A practical approach to the art of public speaking. Examines speech at the informal level, looking at impromptu and anecdotal communication. 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)

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 (Prostko)

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 into the course during Spring Quarter for the following Autumn. Enrollment by consent of instructor and CTL tutoring program.

2 units, Aut (Prostko)

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 (Prostko)

by arrangement

182. Creating Learning Organizations — Helps managers, would-be managers, and their organizations construct new, more powerful business practices by becoming aware of their own learning processes. By challenging habits and personal and organizational myths that disable learning, the capacity to learn is enhanced. Organizational learning and action can be transformed from reactive to proactive to high-performance. Topics: language, structure, and change; learning styles and the intelligence trap; paradox, intuition, and突破口; leverage of systems thinking, expertise, and personal mastery; mental models and belief systems; emotions, attachment, and successful failure; shared vision and strategic intent; team and organizational learning.

1 unit, Sum (Milojkovic) alternate F 9-10:50

* CPPC and CTL report to the Office of the Registrar.

CONFERENCES

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. The Conference Office (415-723-3126) coordinates conferences from June 16 through September 14. Nonacademic Facilities Scheduling in the Registrar’s Office (415-723-6755) coordinates conferences during nonsummer months (September 15 through June 15).

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 Conference Office, Encina Commons, room 123.

Housing and food 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 the Conference Office.

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. Costs of care are paid for by the University, excepting 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; consultation with outside, specified specialists when referred by a Cowell physician (except for care usually covered by insurance); necessary examinations and most laboratory and x-ray tests (except when part of entrance requirements).

The costs of hospitalization, 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 or their own individual policy.

Hours — Cowell is open 8 a.m. to 5 p.m., Monday through Friday, throughout the year. The daytime telephone is 415-723-4841. A physician and other professionals are on call for urgent care at all other times. The after-hours telephone is 723-4861.

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, 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. Through the Haas Center Clearinghouse, the center lists, 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.

The center provides the campus base for Stanford in Washington, an academic program for students 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 the Donald Kennedy Public Service Summer and John Gardner Fellowship Programs, which provide financial support to students undertaking public and community service work, and the Local Government Internship Program, which places Stanford students in paid internships in Bay Area municipal offices. Through the Ravenswood-Stanford Tutoring Program (RSTP) and Stanford Upward Bound, students tutor East Palo Alto and Redwood City students. Through TEAM, students provide recreational programming to Ravenswood schools.

Students interested in public and community service internships, study-service connections, community research, volunteer work, and fellowships should visit the Haas Center or call 415-723-0992.

BOOKSTORE

The Stanford Bookstore, consisting of four branches, is incorporated as a nonprofit cooperative. Membership is held by students, faculty, and administrative staff, and a board of seven directors is elected annually. New and used textbooks are shelved by courses under the school or department. General books, paperbacks, clothing, souvenirs, stationery, supplies, art prints, and gifts are also sold, and there is a photocopying service. The Palo Alto branch of the Bookstore, 135 University Avenue, carries medical and technical books, supplies, stationery, remainder books, medical instruments, best sellers, and some clothing. The Track House branch at Campus Drive and Galvez Street sells sports clothing and equipment. The University Shop at Stanford Shopping Center, open during regular mall hours, sells imprinted souvenirs and clothing. MICRODISC, in the main branch, meets all computer hardware and software needs. Tresidder Express, located in Tresidder Memorial Union, is a convenience store that offers health and beauty aids, snack foods, and bread and dairy items.

OMBUDSPERSON

The original proposal 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 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 Police Department, 415-723-9633, is located at the corner of Campus Drive and Serra Street. It comprises 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.

For additional safety information, see the Stanford Farm 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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* January to July 31, 1994

PUBLIC 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 organizations registered with the Office of Student Activities (OSA) and the ASSU and banking with the student-organization fund of the ASSU. 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 approval and 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 assignment of University rooms, buildings, outdoor space, and Laurence Frost Amphitheater for public events or meet-
AWARDS AND HONORS

FACULTY AND STAFF

KENNETH M. CUTHBERTSON AWARD

The Kenneth M. Cuthbertson Award was established in 1981 for recognition of exceptional service to Stanford University. It was established by members of the faculty who wish to remain anonymous. All members of the Stanford community are eligible for the award; the sole criterion is the quality of the contribution that the recipients have made to the University. The award provides a way of honoring members of the staff and faculty for their efforts on behalf of the University.

The award was first presented in 1981 to the person for whom it is named. Kenneth M. Cuthbertson was one of the early architects of Stanford's long-term financial planning and fundraising program. His service to Stanford has set an enduring standard for those who will come after him.

LLOYD W. DINKELSPIEL AWARDS

The Lloyd W. Dinkelspiel Awards for Outstanding Service to Undergraduate Education at Stanford University are made annually at the Commencement exercises. The two principal awards are made to the faculty or staff members adjudged to have made the most distinctive contribution to the development and enrichment of undergraduate education in its broadest sense. Two awards are also made to graduating seniors who combine academic achievement with effective contributions to undergraduate student life. Preference is given to service in the School of Humanities and Sciences in the area of liberal education. The awards are made from an endowment fund established in memory of Lloyd W. Dinkelspiel, a Stanford alumnus and trustee.

WALTER J. GORES AWARDS

The Walter J. Gores Faculty Achievement Awards for excellence in teaching were established by bequest of Walter J. Gores, Stanford Alumnus of the Class of 1917 and a professor at the University of Michigan for 30 years. Teaching is understood in its broadest sense and includes, in particular, lecturing, leading discussions, tutoring, and advising at the undergraduate or professional levels. Any member of the teaching staff of the University is eligible for an award, including all faculty of professorial rank, instructors, lecturers, teaching fellows, and teaching and course assistants. Normally, each year at least four awards are made from the following categories: teaching fellows and assistants; junior faculty; academic staff (lecturers, senior lecturers); and senior faculty, including members of the adjunct professoriate.

HERBERT HOOVER MEDAL

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 in 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 PRIZES

Awarded during the freshman year, the Boothe Prizes recognize excellence in writing. Students are selected for this honor on the basis of essays written for courses in Cultures, Ideas, and Values and in Freshman English. The prize is named for Mr. and Mrs. D. Power Boothe, Jr., whose gifts to the University reflect their interest in the Humanities.

PRESIDENT’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 Freshman English and Cultures, Ideas, and Values during their first year at Stanford.
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, color, handicap, 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.

REHABILITATION ACT OF 1973

In its programs, activities, and employment, Stanford University does not discriminate on the basis of handicap. An affirmative action officer has been appointed to coordinate the University's efforts to comply with the Rehabilitation Act of 1973 and regulations promulgated thereunder prohibiting discrimination on the basis of handicap. Anyone who believes that in some respect Stanford is not in compliance with the Rehabilitation Act and its regulations should call the Office for Multicultural Development at 415-723-3484.

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 415-723-3484.

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, lists 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 POLICY

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.

POLICY ON SEXUAL HARASSMENT

It is the policy of Stanford University to maintain the University community as a place of work and study for students, faculty, and staff free of sexual harassment and all forms of sexual intimidation and exploitation. It is fundamental to the concepts of academic freedom and equal opportunity that each member of the University community be treated with dignity and without regard to any factor irrelevant to participation in the activities of this community.

It is further the policy of the University to prevent, correct, and remedy sexual harassment. 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.

Reprisals against an individual who in good faith raises a concern or makes a charge about behavior that may violate this policy are against the law and will not be tolerated. Intentionally false charges, however, are 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 freedom of
expression nor will it be permitted to do so. Sexual harassment is not protected expression; it compromises the integrity of the University, its tradition of intellectual freedom, and the trust placed in its members.

Sexual harassment violates state and federal law as well as University policy. Written information on sexual harassment is available at the Office of the Sexual Harassment Coordinating Adviser 415-723-3682. Copies of the University policy on Sexual Assault, which complements this Sexual Harassment policy, as well as all other documents mentioned below, are also available at Coordinating Adviser’s office.

WHAT IS SEXUAL HARASSMENT?

Sexual harassment consists of unwanted sexual advances, requests for sexual favors, and other visual, verbal, or physical conduct of a sexual nature when:

1. It is implicitly or explicitly suggested that submission to or rejection of the conduct will be a factor in any academic or employment decisions or evaluations, or permission to participate in a University activity; or

2. The conduct has the purpose or effect of interfering with an individual’s academic or work performance by creating a hostile and unacceptable educational, work, or student living environment.

The determination of what constitutes sexual harassment depends upon the specific facts and the context in which the conduct occurs. Sexual harassment may take many forms. It may be subtle and indirect or blatant and overt. It may be conduct affecting an individual of the opposite sex or conduct affecting an individual of the same sex. It may occur between peers or between individuals in a hierarchical relationship. The key question is always whether the conduct is 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.

CONSENSUAL RELATIONSHIPS

Those who supervise or evaluate the work of others, both in academic and employment settings, must base their decisions on the merits and must deserve the trust of persons affected by these decisions. To be effective, they must be perceived to make their decisions fairly and without favoritism. 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). 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.

The University has no formal policy prohibiting consensual romantic or sexual relationships among faculty, staff, or students. But 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 and unacceptable environment for others. Furthermore, circumstances may change, and conduct that was previously welcome 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.

GLOSSARY

In addition to “sexual harassment,” which has already been defined, the terms “concern,” “charge,” “complainant,” “informal resolution,” and “grievance” are used in a somewhat technical way in the discussion below. They are used in this policy in the following sense:

A concern is a question or problem involving sexual harassment or similar conduct that an individual wants to discuss without (yet) having made the decision to pursue the matter further. The reason for distinguishing between concerns and complaints is that members of the University community should be able to get advice about behavior that may constitute sexual harassment even if they are not certain that it violates this policy or that they want to take action.

A charge is an assertion that a named individual has violated this policy. A charge may be resolved using informal or formal resolution procedures.

A complainant is an individual making a charge; the complainant must consent to being identified to the person being charged.

Informal resolution of a concern or a charge means an outcome achieved by advising, mediation, or other informal process, rather than through
one of the University's grievance or disciplinary procedures.

**Grievances** are proceedings under one of the University's established grievance procedures. The applicable process depends on the status of the complainant, but in general, a grievance serves to rectify actions that directly and adversely affect the complainant in his or her academic, professional, or employment capacity with the University.

**PROCEDURES AND IMPLEMENTATION**

**WHAT TO DO ABOUT SEXUAL HARASSMENT**

There are many resources for people who may have been sexually harassed. Deans, department chairs, and supervisors are all available to hear concerns from or about individuals within their program areas. The Coordinating Adviser is an expert trained to respond to sexual harassment, and is responsible for overseeing the implementation of this policy. The duties of the Coordinating Adviser include providing information, personally or through the advisers, about the full range of possible ways to proceed.

Any of these individuals may be consulted on a confidential basis; no records are kept, and no steps will be taken that identify the person requesting advice unless and until that person states in writing that the University may take such steps. Please note, however, that while this provision governs the process so far as it is within Stanford's control, there are certain obligations that may require disclosure despite University policy. Under subpoena, or in connection with the applications by others for security clearances or professional licenses (for teaching, or practicing law or medicine, for instance) Stanford personnel can be required to divulge information known to them, even though it was acquired in confidence. When it is important to reduce or eliminate even this risk of disclosure, concerned individuals may wish to avoid giving any names in the initial stages. Additional information and suggestions about confidentiality can be obtained from the Coordinating Adviser.

Regardless of whether an individual is following an informal procedure or a formal grievance, a request that it be reviewed by someone other than his or her immediate supervisor is always honored.

**CONCERNS AND CHARGES**

Students, faculty, and staff members should feel free to discuss any concerns, even when they do not amount to charges, with the Sexual Harassment Advisers or other University officers. The decision to pursue a concern as a charge is always one for the individual who believes that she or he has experienced sexual harassment, although there may be situations in which the University must act even in the absence of a formal charge. For example, when other students or employees may be at risk, the University may investigate and take action on the basis of facts it discovers, but without naming the original source of information.

Any University official receiving a charge of sexual harassment must ensure that the charge is investigated promptly and fully and that effective steps are taken to eliminate harassment where it exists, even when it is too late for a formal grievance to be brought.

A charge may be handled informally or, where applicable, through a formal grievance process. While a request for informal resolution may be made at any time, the more promptly the charge is made, and the more information the complainant can provide, the more likely it is that a full investigation can be conducted effectively.

**INFORMAL RESOLUTION PROCEDURES**

For all parties concerned, informal resolution of charges is generally the preferable course. There are several ways in which charges may be handled informally. These include:

Advice: some people may prefer to try to deal with the situation themselves, at least in the first instance, and may simply want advice about how best to proceed.

Moderated discussion: the complainant may wish to discuss the matter with the other party in the presence of that person’s department chair, dean, or supervisor, or a Sexual Harassment Adviser, or both.

Mediation: where both parties are willing, a more structured mediation may be arranged.

Investigation followed by supervisory action: if significant facts are contested, the department chair, dean, or supervisor of the person accused may undertake an investigation, in consultation with a member of the Sexual Harassment Panel. Although informal, the investigation will be carried out in a way that respects the rights of the person being charged and the privacy of all those involved, including the complainant. The results of such an investigation will be available for use in the event of a subsequent grievance or disciplinary action.

Possible outcomes of informal processes include explicit agreements about future conduct, changes in workplace assignments, substitution of one class for another, or any other appropriate relief.
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 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.

DEAN'S AWARD FOR ACADEMIC ACHIEVEMENT

The Dean of Undergraduate Studies recognizes from five to ten undergraduate students each year for their academic endeavors. The award honors individuals for exceptional accomplishments including course-related work, unusual achievement in independent research, success in national competitions of an academic nature, writing or presentations for a regional or national audience, and other similar achievements. Awardees are selected on the basis of faculty nominations and academic records.

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.

Approximately a tenth of the members of a graduating class are elected to Phi Beta Kappa. Of this number, about one fourth are chosen in their junior year, the remainder in their senior year.

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. Normally, a student will not be considered to have met the breadth standard if he or she has not satisfied all the Distribution Requirements by the time elections to the Stanford chapter are held, early in the Spring Quarter. In its evaluation of the breadth of a student’s program of study, the selection committee looks for achievement beyond the beginning level in areas outside the major.

A grade of “+” 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.
GRIEVANCES

As an alternative to informal procedures, or when informal resolution efforts fail, the complainant may be able to file a grievance. At Stanford, grievance procedures are generally designed to provide a remedy when an individual is adversely affected in his or her University capacity. The applicable procedure depends on the grievant’s status as a student, faculty member, or member of the various staff categories. Generally, the process consists of the grievant’s submission of a written statement, an investigation by a University officer followed by a decision and, in some cases, the possibility of one or more appeals, usually to administrative officers at higher levels. The relevant procedure should be read carefully, since they vary considerably, for example, the Bargaining Unit grievance procedures provide for binding arbitration. Note that if the identified grievance officer has a conflict of interest, an alternate will be arranged; the Coordinating Adviser can help make sure 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 University may mutually agree in writing to extend the time for filing a grievance.

Copies of the following established grievance procedures may be obtained from the Office of the Coordinating Adviser:

- Nonacademic Staff Grievance Procedure (Guide Memo 22.10)
- Collective Bargaining Agreements for unit members
- Academic Staff Grievance Procedure
- Faculty Grievance Procedure (Guide Memo 21.4)
- Student Academic Grievance Procedure (see “Academic Grievance Procedure” section of this bulletin)
- Student Employee Grievance Procedure (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).

If the complaint is regarding an employee, the procedure is different. The complaint and the Coordinating Adviser will be informed of any disciplinary action that is imposed.

RESOURCES FOR DEALING WITH SEXUAL HARASSMENT

OVERVIEW

Enforcement of this policy is the responsibility of the senior University officers (deans, vice presidents, and their delegates) responsible for faculty, staff, and student affairs; the Sexual Harassment Coordinating Adviser is responsible for coordinating its implementation. Anyone who believes he or she may have been sexually harassed, or who has individual concerns about sexual harassment in the University, is encouraged to discuss the matter with any University officer and obtain guidance and advice about available procedures. Informal, local resolution of a concern or charge is preferable whenever feasible. There are, however, a number of individuals specially trained, and charged with specific responsibilities, in the area of sexual harassment.

Each school and administrative unit may also designate an individual or group of individuals to respond to concerns or charges.

COORDINATING ADVISER

The coordinating adviser is responsible for coordinating the implementation of the Sexual Harassment Policy. He or she provides advice to individuals and generally coordinates matters arising under this policy. Among the most important functions of the Coordinating Adviser are:

- Publishing and disseminating an informational pamphlet containing this policy and providing guidance for those affected by sexual harassment.
- Distributing this policy statement to all students, faculty, and staff at the time of their joining the University and annually thereafter.
- Distributing and posting relevant material and making any reports required by state or federal law.

The duties of the Coordinating Adviser also include (1) acting as one of the Sexual Harassment Advisers; (2) supervising the day-to-day advising duties of the other advisers; (3) acting as a resource to the Sexual Harassment Panel; (4) providing information to other University officers about sexual harassment; (5) being aware of, and encouraging and facilitating the use of, prevention education resources specific to sexual harassment; (7) maintaining records of every charge, including the names of the complainant and the person being charged and the disposition of the charge; (8) transmitting to the President annually a report of the number of charges
made to the advisers and other University officers; (9) taking other action necessary to implement this policy. The Coordinating Adviser reports to the Provost.

SEXUAL HARASSMENT ADVISERS

Sexual Harassment Advisers are appointed by the Provost and may include faculty, students, and staff. Although training is provided to all new advisers whenever possible, the advisers include at least one faculty member with expertise in the field.

Advisers are responsible to discuss any concerns or charges with students, faculty, or staff members, to provide copies of this policy, and to explain the internal options. If requested, an adviser may assist an individual in making a police report. Advisers do not keep permanent records or files reflecting their discussions. Even if an individual does not wish to make a charge and no further action is taken by the University, the adviser may be able to give useful advice. If an individual decides to make a charge, however, the facts of the charge and the identity of the parties involved will be recorded, and the adviser will consult with the coordinator before taking any specific action to resolve the matter informally.

THE SEXUAL HARASSMENT PANEL

The Sexual Harassment Panel acts as an optional resource to school or administrative officers responsible to investigate charges and remedy situations where sexual harassment is found. The panel is also a resource to University officers hearing grievances involving sexual harassment.

Members of the panel are appointed by the President. The panel may include faculty, students, and staff. On request of the cognizant University official, the panel (or one or more of its members, as determined by its chair) will advise and assist administrative officers in investigating or considering action based on a charge of sexual harassment. In any formal grievance procedure in which sexual harassment is asserted, the University grievance officer will consult the panel, which will provide guidance and advice. The panel reports to the Coordinating Adviser on every charge in which it is involved.

RESOURCES WITHIN ACADEMIC OR ADMINISTRATIVE UNITS

The cognizant University official (deans of schools and heads of other administrative units) may handle concerns and charges themselves or with the help of an advisory individual or group. The Coordinating Adviser is available to facilitate training of individuals so designated. Charges brought to a school or administrative unit (either by the complainant in the first instance, or because the charge cannot be resolved informally by an adviser) is handled as follows:

1. If facts are disputed, the charge will be investigated by the cognizant University official; once the facts are determined, if sexual harassment (or other unfair or inappropriate action) is found, the cognizant University official will attempt to reach a negotiated or mediated resolution.

2. If a negotiated or mediated resolution is not reached, the cognizant University official will take appropriate action.

3. In either case the complainant and the Coordinating Adviser will be advised of the outcome of the investigation and the action, if any, taken in response to the charge.

Those handling charges brought to schools or administrative units are strongly encouraged to consult with the panel (or a member designated by the chair of the panel) concerning the investigation and remedies. In any event, the disposition of every charge shall be reported to the Coordinating Adviser.

POLICY REVIEW AND EVALUATION

This policy went into effect on October 6, 1993. After it has been in effect for two years, the Provost will establish a committee that includes faculty, staff, and students to evaluate it and make recommendations for its improvement.

POLICY ON SEXUAL ASSAULT

Background — Stanford University’s policy and procedures on sexual harassment are published in Administrative Guide Memo 23.2 and are republished annually in the Courses, Degrees, and Information 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 415-723-9633 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 415-493-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 (415-723-3785) 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 **Courses, Degrees, and Information**. Victims are to be kept informed by those responsible for those procedures of the status of any disciplinary proceedings and the results of any disciplinary action or appeal, providing that the victim agrees in advance, 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 offices 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.

**POLICY ON CAMPUS DISRUPTION**

Because the rights of free speech and peaceful 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 her-
self as such; members of the faculty, staff, or student body also have an obligation to identify themselves, when requested to do so by such 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

A. Except for authorized academic purposes, the knowing 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, with 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 Junior University, whether owned or leased, and whether located in the United States or abroad.

POLICY ON CONTROLLED SUBSTANCES AND ALCOHOL

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 use, students and others should be aware of the health and safety risks associated with its use, as well as the state and local laws about 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. The health risks associated with the use of illicit drugs and the abuse of alcohol include various deleterious physical and mental consequences including addiction, severe disability, and death. Information concerning the known effects of alcohol and specific drugs is available from the Alcohol and Drug Information Center at the Cowell Student Health Center.

The goal of this policy is to reduce drug and alcohol abuse and the human and material costs associated with it. The University, as an educational institution, approaches student conduct issues from a perspective that places greater emphasis on individual responsibility and development than on regulatory measures. Consequently, education about and prevention of al-
coital problems will continue to be our primary emphasis. Moreover, it is the intention of the University that students as individuals and as members of groups will 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 and 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.

**SOME APPLICATIONS**

No University funds or funds collected by the University may be used in a way which violates the policy.

While there are a few freshmen at Stanford who are 21 or older, and residence staff members often are in the 21 or older age range, the fact remains that the great majority of residents of an all-freshman dormitory are minors. Consequently, it is hard to imagine how house dues for all-freshman residences could be used to buy alcohol without violating both state law and University policy.

Notwithstanding the foregoing, regardless of how money is collected, all provisions of the policy apply to all students, faculty, and staff.

Event planners will be held individually and collectively responsible for planning and carrying out events in compliance with the policy. One or more house/organization officers must assume responsibility for the event’s compliance with the alcohol policy. These officers’ names must be made available to the police and to the University upon request.

**CONSEQUENCES OF VIOLATION**

Educational and rehabilitative measures will be the preferred response to infractions unaccompanied by more egregious conduct. However, behavior could run the gamut from a simple Minor in Possession (of alcohol) with no prior disciplinary history to drunken behavior resulting in loss of life. Penalties will be calibrated according to the severity of the misconduct. Behavior associated with drug or alcohol use and abuse may constitute one or more of the following.

1. Violation of the University residence agreement or "Terms and Conditions of Fraternity Occupancy," subjecting the student to loss of University housing.
2. Violation of student organization conditions of recognition, subjecting the student to expulsion from the organization and/or the organization’s loss of University recognition and associated privileges.
3. Violation of the Fundamental Standard, subjecting the student to University discipline, which includes as a possible outcome suspension or expulsion from Stanford.

Inebriation is not an excuse for misconduct but rather is an aggravating circumstance. A student’s careless or willful reduction, through the use of alcohol or other intoxicants, of his or her own ability to think clearly, exercise good judgment, and respond to rational intervention is considered grounds for more stringent penalties than might be levied otherwise.

Residences or student organizations found to have violated the policy are subject, as groups, to University sanctions such as suspension of social privileges and loss of University recognition, meeting space, and housing, if applicable.

**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 may be held legally liable for the consequences of serving alcohol to underage drinkers or to obviously intoxicated persons.

**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 September, 1990, 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 in a public place and unable to exercise care for one's own safety or that of others (California Penal Code 647).
5. For persons under 21 to have any container of alcohol in any public place or any place open to the public (Business and Professions Code 25662).
6. To operate a motor vehicle while under the influence of alcohol or other intoxicants or with a blood alcohol level of .08% or higher (California Vehicle Code 23152).
7. 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, 23224).
8. To have in one's possession or to use false evidence of age and identity to purchase alcohol (California Business and Professions Code 25661).
9. To illegally manufacture, sell, distribute, or possess controlled substances (those listed in Schedules I through V of the Controlled Substances Act) (21 USC 812; 21 USC 828, 841, 844, 845, 845A).
11. 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

Campus Resources (Area Code 415) — The Bridge (phone 723-3392); Counseling and Psychological Services (phone 723-3785); Campus Ministries (phone 723-3114); Cowell Urgent Care phone 723-4861; Stanford Alcohol and Drug Treatment Center (phone 723-6682).

Project R2ISC: Risk Reduction of Intoxicants n the Stanford Community, a student-led program associated with Cowell Health Center and ts Health Promotion Program, which provides educational programs, party-planning assistance, and information about the use and misuse of alcohol and drugs (phone 723-0821).

Alcohol and other Drug Information Center (phone 723-0821).

STOP: provides pick-up from parties to prevent alcohol-impaired driving (phone 725-STOP).

Community Resources — Alcoholics Anonymous (phone 415-573-6811); Al-Anon (phone 415-873-2356); Bay Area Hotline (phone 415-366-7374); Cocaine Hotline (phone 1-800-COCAINE); National Council on Alcoholism Hotline (phone 1-408-267-HELP).

SMOKE-FREE ENVIRONMENT

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 is 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, 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.
Admissions information and applications can be obtained from the Office of Undergraduate Admissions and the Graduate Admissions Section of the Registrar's Office (Old Union).

Financial aid information for undergraduate and graduate students is available from the Financial Aids 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, Chicanoas, 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: Courses, Degrees, and Information may be purchased from the Bookstore or by sending a $6.00 check or money order ($6.45 if a California resident; add $2.90 if domestic first class mail is desired) to the Registrar's Mailroom. Summer at Stanford may be obtained from the Summer Session Office. Individual schools and departments may be contacted directly for more specific information.

Students from other countries may contact the Graduate Admissions Section of 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).

Campus Report, the weekly faculty/staff newspaper (includes events calendar and employment opportunities), available from News Service (Press Bldg.).

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 the Graduate Admissions Section of 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 Visitor's 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 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.

Allen, P. C., Stanford: From the Foothills to the Bay, 1980

Clark, G. T., Leland Stanford, 1931

Elliott, O. L., Stanford University: The First Twenty-five Years, 1937


Nagel, G. W., Jane Stanford: Her Life and Letters, 1975

Stockholm, G., Stanford Memorial Church, 1980


Tutorow, N. E., Leland Stanford: Man of Many Careers, 1971
APPENDIX

COURSES CERTIFIED FOR 1994-95 AS FULFILLING THE UNDERGRADUATE DISTRIBUTION REQUIREMENTS

The Distribution Requirements were revised for Freshmen who entered Stanford in Autumn Quarter 1991 and thereafter. Information regarding the Distribution Requirements may be found in the "Degrees" section of this bulletin, p. 11-12. Included in the section is information regarding a petition process for students who believe they have strong reason to fulfill a requirement by substituting some alternative course for any certified listing.

The following courses have been certified as fulfilling the Distribution Requirements in 1994-95. The symbol (†) indicates courses in Areas 2-9 which also fulfill the Gender Studies Requirement.

NOTE 1 — In order to satisfy particular Area Distribution Requirements with transfer work, the transfer course(s) must be substantially similar to those course(s) offered at Stanford which satisfy the specific Distribution Requirement Area(s).

NOTE 2 — Except where noted otherwise, no course may be applied to more than one Area of the Requirements by an individual student. In addition, certain sequences must be completed in their entirety for Distribution Requirement fulfillment, and those sequences are noted below.

NOTE 3 — By way of standing exception, the Gender Studies component of the Distribution Requirements may be satisfied by completing one course from among those approved for inclusion on a list of routine substitutes drawn up annually by the C-US Subcommittee on Distribution Requirements, based on information provided by departments. These courses are listed at the end of this section following Area 9.

NOTE 4 — Courses offered overseas during 1994-95 which satisfy Distribution Requirements are listed at the end of this section following Area 9.

AREA 1: CULTURES, IDEAS, AND VALUES

Anthropology 8, 9, 10; Origins, Encounters, and Identities (entire sequence must be completed)
CIV 1, 2, 3; Great Works (entire sequence must be completed)
CIV 4, 5, 6; Europe and the Americas (entire sequence must be completed)

English 7, 8, 9; Literature and the Arts (entire sequence must be completed)

German Studies 7A, 8A, 9A; Myth and Modernity (entire sequence must be completed)

History 1, 2, 3; Europe: 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)

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 Areas 7 {2} and 8 {3})

Science, Technology, and Society 1, 2, 3; Technology and Culture (entire sequence must be completed; given 1995-96)

AREA 2: WORLD CULTURES (NON-WESTERN CULTURE UNDER THE 1980 DR SYSTEM)

African and Afro-American Studies 114; Africa and the Black Diaspora

African and Afro-American Studies 115; Africa and Philosophy, Philosophy and Africa

Anthropology 1; Introduction to Social and Cultural Anthropology

† Anthropology 11; Sex Roles and Society

† Anthropology 11C (same as Feminist Studies 148); Gender in Cross-Cultural Perspectives

Anthropology 14; Cultures in Crisis

Anthropology 19; Magic, Witchcraft, and Religion

Anthropology 102; Native American Cultures of North America

Anthropology 102A; Native Peoples and Cultures of the Southwest

Anthropology 103; Mesoamerican Communities, Ethnicities, and Nations

Anthropology 108; African Societies in a Changing World

Anthropology 114; Introduction to Chinese Society

† Anthropology 117; Traditional Chinese Society

Anthropology 118A; 20th-Century Chinas

Anthropology 121; Japanese Society and Culture

Anthropology 123; Japanese Economic Organization

† Anthropology 117; Traditional Chinese Society

Anthropology 118A; 20th-Century Chinas

Anthropology 121; Japanese Society and Culture

Anthropology 123; Japanese Economic Organization
Anthropology 126; The Middle East Through Ethnography
Anthropology 164 (same as Human Biology 134); Ecological Anthropology
Anthropology 165; Psychological Anthropology
Anthropology 168; Medical Anthropology
Anthropology 182A; Archaeology and Education at Zuni Pueblo
Art 2; Ideas and Forms in Asian Art
Art 129; Arts of War and Peace: Late Medieval and Early Modern Japan
Asian Languages 91; Traditional East Asian Civilization: China
Asian Languages 92; Traditional East Asian Civilization: Japan
Asian Languages 110; Japanese-Western Literary and Cultural Interaction
Asian Languages 132; Chinese Fiction and Drama in Translation
Asian Languages 133; Modern Chinese Literature in Translation
Asian Languages 134; Contemporary Chinese Literature
Asian Languages 138; Modern Japanese Literature in Translation
Asian Languages 152 (same as History 195); Nomad Empires of Inner Asia
Asian Languages 153 (same as History 193, History and Philosophy of Science 153); Science and Technology of Traditional China
Asian Languages 156 (same as History 192A); China from Earliest Times to the 9th Century
Classics 105; History and Culture of Ancient Egypt
Dance 177 (same Anthropology 109, Spanish and Portuguese 177); Dance and Culture in Latin America
French 262; Contemporary Francophone Literature: Africa, Caribbean
History 24A; Russian Civilization, 9th to the 17th Centuries
History 85S; Jews and Muslims
History 148C; Africa: The 20th Century
History 184; The History of Iran
History 185; Introduction to Islamic Civilization
History 186A (same as Anthropology 120); Modern India
History 187A; The Middle East, 570-1718
History 187C (same as Feminist Studies 120); Women in the Contemporary Middle East
History 189A; Israel: 1880 to the Present
History 192B; Chinese History
History 192C; Modern China
History 194A; Early and Medieval Japan to 1500
History 194B; History of Japan, 15th-19th Century
History 194D; Rise of Modern Japan
History 195; A History of Japanese Religion
History 289; The Ottoman Empire
Human Biology 145; Third-World Development
Linguistics 162; English Transplanted, English Transformed: Pidgins and Creoles
Linguistics 625A,B,C; Topics in Arabic Literature and Culture
Philosophy 46 (same as Asian Languages 46, Religious Studies 55); Introduction to Chinese Thought
Political Science 25; Colonialism and Nationalism in the Third World
Political Science 114K; The Political Economy of Development
Political Science 115; Politics in the People’s Republic of China
Political Science 118A; Political Change in Tropical Africa
Political Science 118B; Southern Africa: Race, Class, and Political Change
Religious Studies 1E (same as Philosophy 41); Eastern and Western Conceptions of the Self
Religious Studies 11; Religious Classics of Asia
Religious Studies 14; Introduction to Buddhism
Religious Studies 18; Zen Buddhism
Religious Studies 20; Chinese Religious Thought and Practice
Religious Studies 116; Japanese Buddhism

AREA 3: AMERICAN CULTURES
(Non-Western Culture under the 1980 DR system is indicated by *)
African and Afro-American Studies 105 (same as Anthropology 105); Introduction to African and Afro-American Studies (*)
African and Afro-American Studies 161C (same as English 161C); 20th-Century Afro-American Fiction
African and Afro-American Studies 161D; Afro-American Autobiography
Anthropology 15 (same as Education 116X, African and Afro-American Studies 15); Anthropological Perspectives on American Culture
Anthropology 102; Native American Cultures of North America (*)
Anthropology 102A; Native Peoples and Cultures of the Southwest (*)
Anthropology 130 (same as African and Afro-American Studies 122, Communication 138); Film Images of African American Culture
Anthropology 150; American Indian Ways of Knowing
Anthropology 182B; Cultural Anthropology of the West
Comparative Literature 163; Introduction to Contemporary Issues in Asian-American Studies
Drama 65; American Musical Theater
Drama 154N; American Drama 1900-1965
Drama 155; American Drama 1960s to the Present
Education 107X (same as Linguistics 172); Linguistic Foundations of Racial Strife in American Education
† English 124A (same as Spanish and Portuguese 289); Chicano Cultural Studies
† English 126; 20th-Century American Fictions
English 168A; 20th-Century American Indian Writing
English 169B (same as Comparative Literature 169B); Asian American Novel
English 169D (same as Comparative Literature 169D); Asian American Short Fiction and Drama
† History 151; American Labor History
History 157; Afro-American History
History 159; Introduction to Asian American History
History 164 (same as American Studies 164); Race and Ethnicity in the American Experience
History 165B; 19th-Century America
History 165C; The U.S. in the 20th Century
History 253A; Topics in the History of the American West
Linguistics 73; African-American Vernacular English
Linguistics 153 (same as Urban Studies 165); Inter- and Intra-ethnic Variation in Urban Vernacular English
Political Science 60; The American Dream
Political Science 181; African Americans and the Political System
† Religious Studies 8; Religion in America
Religious Studies 53; Jews and Judaism in America
Religious Studies 143 (same as Spanish 180); Introduction to Chicano Life and Culture
† Religious Studies 163; Religion and Ethnicity
Spanish 207; Language Use in Chicano Communities

AREA 4: MATHEMATICAL SCIENCES
(Area 6 under the 1980 DR system)
Biology 141; Biostatistics
Mathematics 19; Calculus
Mathematics 20; Calculus
Mathematics 21; Calculus
Mathematics 41; Calculus
Mathematics 42; Calculus
Mathematics 43; Calculus
Mathematics 43H; Honors Calculus
Mathematics 103; Matrix Theory and its Applications
Philosophy 159 (same as Linguistics 135); Basic Concepts in Mathematical Logic
Philosophy 160A; First-Order Logic
Psychology 60; Statistical Methods
Statistics 40; Chance and Strategy
Statistics 60; Introduction to Statistical Methods
Statistics 110; Statistical Methods in Engineering and the Physical Sciences
Statistics 116; Theory of Probability
Statistics 190 (same as Economics 80); Statistics for Social Scientists

AREA 5: NATURAL SCIENCES
(Area 7 under the 1980 DR system)
Anthropology 6 (same as Human Biology 6); Human Origins
Astronomy 15A; The Nature of the Universe
Biology 1; Introduction to Biology
Chemistry 31; Chemical Principles
Chemistry 32; Frontiers of Chemical Science
Chemistry 33; Structure and Reactivity
Geological and Environmental Sciences 1; Planet Earth
Geological and Environmental Sciences 2; Earth History
Human Biology 2A or 3A or 4A; Human Biology Core
Physics 11; Symmetries of Nature
Physics 14; Physics of Music
Physics 15B; Cosmic Horizons
Physics 19; An Introduction to Physics (Physics for Poets)
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 I
Physics 29; Electricity and Magnetism II
Physics 50; Astronomy Laboratory and Observational Astronomy
Physics 51; Mechanics
Physics 53; Electricity and Magnetism
Physics 55; Light and Heat
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 70; Brain and Behavior
AREA 6: TECHNOLOGY AND APPLIED SCIENCE
(Area 8 under the 1980 DR system)

Civil Engineering 106; Water Resources
Civil Engineering 170 (same as Science, Technology, and Society 182); Environmental Science and Technology
Civil Engineering 176; Small Scale Energy Systems
Computer Science 105A; Introduction to Computers
Computer Science 106A; Programming Methodology
Computer Science 106B; Programming Abstractions
Computer Science 106X; Programming Methodology and Abstractions
Computer Science 109A; Introduction to Computer Science
Engineering 1 (same as Science, Technology, and Society 51); Nature of Engineering
Engineering 14; Applied Mechanics: Statics and Deformables
Engineering 15; Dynamics
Engineering 30; Engineering Thermodynamics
Engineering 35; Automotive Technology
Engineering 40; Introductory Electronics
Engineering 50; Introductory Science of Materials
Engineering 62; Introduction to Operations Research I
Engineering 165 (same as Music 156); Technology and Musical Aesthetics
Engineering-Economic Systems 31; Introduction to Decision Analysis
Geological and Environmental Sciences 5; Earth's Nonrenewable Resources
Geological and Environmental Sciences 8; Management of Geologic Hazards
Geological and Environmental Sciences 130; Environmental Earth Sciences I
Geological and Environmental Sciences 150; The Oceans: An Introduction to the Marine Environment
Geophysics 4; Natural Hazards and Human Survival
Geophysics 170; Environmental and Geotechnical Geophysics
Operations Research 50/150; Models and Applications of Operations Research in Society
Petroleum Engineering 103; Energy Resources

AREA 7: LITERATURE AND FINE ARTS
(Area 2 under the 1980 DR system; Non-Western Culture under the 1980 DR system is indicated by {*})

A) Courses typically taken either by non-majors or by people without special preparation:
Art 1; Introduction to the Visual Arts
Art 2; Ideas and Forms in Asian Art {*}
Art 3; Introduction to the History of Architecture
Art 10; Introduction to Art: Renaissance to the Threshold of the Modern Age
Art 11; Introduction to Ancient Art
Art 20; Introduction to the Art of Asia: to 600 A.D. {*}
Art 21; Introduction to the Art of Asia: 7th to 13th Centuries {*}
Art 22; Introduction to the Art of Asia: 14th Century Onward {*}
Asian Languages 91; Traditional East Asian Civilization: China {*}
Asian Languages 92; Introduction to East Asian Civilization: Japan {*}
Classics 11; The Concept of the Hero: Homer to Milton
Classics 12 (same as Drama 53); Greek Tragedy
Classics 21; Modern Greek Folklore and Ancient Greek Mythology
† Dance 160A (same as Drama 127A, Feminist Studies 160A); Dance History and Philosophy
† Dance 160B (same as Drama 127B); Dance and Live Art in the 20th Century
Dance 177 (same as Anthropology 109); Dance and Culture in Latin America {*}
Dance 268 (same as Education 218); Society, Education, and Dance
Engineering 165 (same as Music 156); Technology and Musical Aesthetics
English 10/110; Masterpieces of English Literature I
† English 11/111; Masterpieces of English Literature II
English 12/112; Masterpieces of American Literature
English 30/130; The Novel
English 40/140 (same as Drama 50); Introduction to Drama
English 50/150; Poetry and Poetics
† English 50G/150G (same as Feminist Studies 164); Poetry and Poetics
English 65A/165A (same as Medieval Studies 165); Introduction to Medieval Culture
English 65B/165B; Arthurian Literature
English 73 (same as Drama 59); Shakespeare
German Studies 32A; Origins of Modernism
Music 1; Introduction to Music
Music 2A: The Symphony
Music 3F; Franz Liszt and the Music of the Romantic Era
Music 5A; Music in America
Music 21; Elements of Music
Religious Studies 15; Hebrew Bible: Issues of Power
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>Art 100A</td>
<td>Ancient Art I</td>
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<tr>
<td>Art 100B</td>
<td>Ancient Art II</td>
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<tr>
<td>Art 103</td>
<td>Late Roman and Byzantine Empire</td>
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<tr>
<td>Art 107</td>
<td>Age of Cathedrals</td>
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<td>Art 108</td>
<td>Age of Realism</td>
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<td>Art 110A</td>
<td>The Origins of the Renaissance</td>
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<td>Art 110B</td>
<td>Early Renaissance Art</td>
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<tr>
<td>Art 110C</td>
<td>High Renaissance Art</td>
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<tr>
<td>Art 115A</td>
<td>Artistic Culture in Italy during the 17th Century</td>
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<tr>
<td>Art 115B</td>
<td>17th-Century Art in the Low Countries</td>
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<tr>
<td>Art 116</td>
<td>Five Great Masters of the Baroque Age</td>
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<tr>
<td>Art 116A</td>
<td>Art and Architecture in the Age of the Baroque</td>
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<tr>
<td>Art 120A</td>
<td>18th-Century Art in Europe</td>
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<tr>
<td>Art 120B</td>
<td>Painting in the Age of Revolution</td>
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<tr>
<td>Art 120C</td>
<td>The Age of Naturalism 1830-1874</td>
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<tr>
<td>Art 129</td>
<td>Arts of War and Peace: Late Medieval and Early Modern Japan (*)</td>
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<tr>
<td>Art 130</td>
<td>Art in America and Britain 1670-1825</td>
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<td>Art 130A</td>
<td>Art in America 1825-1910</td>
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<td>Art 175A</td>
<td>Modern Architecture I</td>
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<td>Art 175B</td>
<td>Modern Architecture II</td>
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<td>Art 176</td>
<td>American Architecture and Urbanism</td>
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<tr>
<td>Asian Languages 110</td>
<td>Japanese-Western Literary and Cultural Interaction (*)</td>
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<tr>
<td>Asian Languages 131</td>
<td>Chinese Poetry in Translation (*)</td>
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<tr>
<td>Asian Languages 132</td>
<td>Chinese Fiction and Drama in Translation (*)</td>
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<tr>
<td>Asian Languages 133</td>
<td>Modern Chinese Literature in Translation (*)</td>
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<tr>
<td>Asian Languages 134</td>
<td>Contemporary Chinese Literature (*)</td>
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<tr>
<td>Asian Languages 135</td>
<td>Japanese Drama in Translation (*)</td>
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<tr>
<td>Asian Languages 137</td>
<td>Japanese Fiction in Translation (*)</td>
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<tr>
<td>Asian Languages 138</td>
<td>Modern Japanese Literature in Translation (*)</td>
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<tr>
<td>Asian Languages 142</td>
<td>Constructing the Subject</td>
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<tr>
<td>Asian Languages 181</td>
<td>Japanese Women Writers (*)</td>
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<tr>
<td>Classics 169</td>
<td>Greek Ethical Philosophy: Socrates, Plato, and Aristotle</td>
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<tr>
<td>Drama 151</td>
<td>Performance and the Body Politic</td>
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<td>Drama 152</td>
<td>Performance and the Body</td>
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<td>Drama 153</td>
<td>Performance and the Mind</td>
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<tr>
<td>English 113</td>
<td>The Renaissance</td>
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<tr>
<td>English 115</td>
<td>Survey of 18th-Century Literature</td>
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<tr>
<td>English 126</td>
<td>20th-Century American Fiction</td>
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<tr>
<td>English 132G</td>
<td>19th-Century English Novel</td>
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<td>English 133G</td>
<td>20th-Century Novel in English</td>
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<tr>
<td>English 137</td>
<td>Development of the Short Story</td>
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<tr>
<td>English 160D</td>
<td>(same as Communication 128); Cinema and Literature</td>
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<td>English 164A</td>
<td>Speaking Back to Scripture</td>
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<tr>
<td>English 164B</td>
<td>Imagining the Holocaust</td>
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<tr>
<td>English 164C</td>
<td>Ecology and Imagination</td>
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<tr>
<td>English 167A</td>
<td>Literature of Fantasy</td>
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<tr>
<td>English 173A</td>
<td>(same as Drama 159A); Shakespeare</td>
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<tr>
<td>English 173B,C</td>
<td>(same as Drama 159B,C); Shakespeare</td>
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<tr>
<td>French 130</td>
<td>Middle Ages and Renaissance France</td>
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<tr>
<td>French 131</td>
<td>17th- and 18th-Century France</td>
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<tr>
<td>French 132</td>
<td>19th- and 20th-Century France</td>
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<td>French 192</td>
<td>Women's Writing in France</td>
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<td>French 206E</td>
<td>The Grail in Modern Culture</td>
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<tr>
<td>German Studies 121</td>
<td>Contemporary German Drama</td>
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<tr>
<td>German Studies 161/161A</td>
<td>Faust</td>
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<tr>
<td>Italian 233</td>
<td>Dante's Divine Comedy</td>
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<tr>
<td>Italian 266E</td>
<td>Women's Voices in Contemporary Italian Fiction</td>
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<tr>
<td>Italian 272E</td>
<td>(same as Comparative Literature 272E); Italo Calvino in Translation</td>
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<tr>
<td>Italian 281E</td>
<td>(same as Comparative Literature 281E); Pirandello, Sartre, and Beckett</td>
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<tr>
<td>Linguistics 72</td>
<td>(same as English 105); Point of View in Fiction: A Linguistic Approach</td>
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<tr>
<td>Linguistics 625A,B,C</td>
<td>Topics in Arabic Literature and Culture</td>
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<tr>
<td>Religious Studies 112</td>
<td>Sexual Politics in the Ancient World</td>
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<tr>
<td>Spanish 153</td>
<td>Women and Transgression in Spanish Renaissance</td>
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</tbody>
</table>

**C) Courses where some foreign language preparation is necessary:**

- German Studies 120; Modern Short Prose
- German Studies 122; German Literature
- Italian 244 (same as Comparative Literature 244E); Italian Romanticism
- Spanish and Portuguese 130B; Spanish Cultural Perspectives
- Spanish and Portuguese 140; Introduction to the Methods of Literary Analysis
Spanish and Portuguese 150; Spanish Literature I  
Spanish and Portuguese 151; Spanish Literature II  
Spanish and Portuguese 160; Spanish-American Literature I  
Spanish and Portuguese 161; Spanish-American Literature II  

**AREA 8: PHILOSOPHICAL, SOCIAL, AND RELIGIOUS THOUGHT**  
(Area 3 under the 1980 DR system; Non-Western Culture under the 1980 DR system is indicated by {*})

<table>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>Anthropology 152</td>
<td>Symbolic Anthropology</td>
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<tr>
<td>Anthropology 154 (same as Feminist Studies 147, Religious Studies 154)</td>
<td>Creation and Procreation</td>
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<tr>
<td>Anthropology 160 (same as Feminist Studies 147A, History and Philosophy of Science 160, Human Biology 170)</td>
<td>Gender and Science</td>
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<tr>
<td>Asian Languages 142; Constructing the Subject</td>
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<tr>
<td>Classics 18; Greek Mythology</td>
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<tr>
<td>Classics 108; Pagans and Christians</td>
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<tr>
<td>Classics 165 (same as Philosophy 119); Hellenistic Philosophy</td>
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<tr>
<td>Classics 169; Greek Ethical Philosophy: Socrates, Plato, and Aristotle</td>
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<tr>
<td>English 65A/165A (same as Medieval Studies 165); Introduction to Medieval Culture</td>
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<tr>
<td>French and Italian 208E; Female Saints</td>
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<tr>
<td>German Studies 33A/133; Culture and Politics in Contemporary Germany</td>
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<tr>
<td>History 37S; Love in the Age of Revolution</td>
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<td>History 136A; European Thought in the 19th Century</td>
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<td>History 195; A History of Japanese Religion</td>
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<td>Italian 281E (same as Comparative Literature 281E)</td>
<td>Pirandello, Sartre, and Beckett</td>
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<tr>
<td>Philosophy 10; Knowledge, Self, and World</td>
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<tr>
<td>Philosophy 20 (same as Public Policy 103C); Introduction to Moral Theory</td>
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<td>Philosophy 30 (same as Public Policy 103A); Introduction to Political Philosophy</td>
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<tr>
<td>Philosophy 46 (same as Asian Languages 46, Religious Studies 55); Introduction to Chinese Thought {*})</td>
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<td>Philosophy 60 (same as History and Philosophy of Science 60); Introduction to the History and Philosophy of Science</td>
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<td>Philosophy 80; Mind, Matter, and Meaning</td>
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<td>Philosophy 100; Greek Philosophy</td>
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<td>Philosophy 102; Modern Philosophy, Descartes to Kant</td>
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<tr>
<td>Philosophy 138A (same as Classics 138A, History 138A, History and Philosophy of Science 138A); Introduction to Cosmology: Ancient Period</td>
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<td>Philosophy 138B (same as Classics 138B, History 138B, History and Philosophy of Science 138B); Introduction to Cosmology: Science and Technology in the Scientific Revolution</td>
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<td>Philosophy 138C (same as Classics 138C, History 138C, History and Philosophy of Science 138C); Introduction to Cosmology: Newton to Einstein</td>
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<td>Political Science 151A; History of Political Thought I</td>
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<td>Political Science 151B; History of Political Thought II</td>
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<td>Political Science 151C; History of Political Thought III</td>
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<td>Political Science 153; Utopian Political Thought</td>
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<tr>
<td>Political Science 154 (same as Feminist Studies 138, Philosophy 175C); Feminist Theory: Gender, Power, and Justice</td>
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<td>Religious Studies 1E (same as Philosophy 41); Eastern and Western Conceptions of Self {*}</td>
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<td>Religious Studies 5; Basic Issues in Religion</td>
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<td>Religious Studies 8; Religion in America</td>
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<tr>
<td>Religious Studies 11; Religious Classics of Asia {*})</td>
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<tr>
<td>Religious Studies 14; Introduction to Buddhism {*})</td>
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<td>Religious Studies 15; Hebrew Bible: Issues of Power</td>
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<td>Religious Studies 18; Zen Buddhism {*}</td>
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<td>Religious Studies 23; Introduction to Judaism</td>
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<td>Religious Studies 24; Introduction to Christianity</td>
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<td>Religious Studies 42 (same as Philosophy 42); Philosophy of Religion</td>
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<td>Religious Studies 53; Jews and Judaism in America</td>
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<td>Religious Studies 65; Introduction to Christian Ethics</td>
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<tr>
<td>Religious Studies 112 (same as Feminist Studies 155); Sexual Politics in the Ancient World</td>
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<tr>
<td>Religious Studies 142 (same as Classics 104); Early Christianity</td>
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<tr>
<td>Religious Studies 164 (same as Philosophy 174A); The Morality of Peace and War</td>
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<tr>
<td>Religious Studies 166; Myth and Ritual in Judaism</td>
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<tr>
<td>Religious Studies 264; Adam and Eve: Sexuality and Gender</td>
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<tr>
<td>SLE 91, 92, 93; Structured Liberal Education (entire sequence must be completed and thereby also satisfies Areas 1 and 7{2})</td>
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<tr>
<td>Sociology 170; Classics of Modern Social Theory</td>
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<tr>
<td>Science, Technology, and Society 110 (same as Public Policy 103B); Ethics and Public Policy</td>
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</table>
AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Areas 4 and 5 under the 1980 DR system are indicated by {4} and {5}; Non-Western Culture under the 1980 DR system is indicated by {*})

Anthropology 1; Introduction to Social and Cultural Anthropology {4} or {5} {*}
Anthropology 2 (same as Human Biology 1); Genes, Culture, and Human Diversity {5} {*}
Anthropology 3; Human Prehistory {5} {*}
Anthropology 4; Language and Culture {4} or {5}
† Anthropology 7; Investigating Culture, Introduction to Anthropology {5}
† Anthropology 11C (same as Feminist Studies 140); Gender in Cross-Cultural Perspective {5} {*}
† Anthropology 12 (same as Feminist Studies 101); Introduction to Feminist Studies {5}
Anthropology 15/116 (same as Education 116X, African and Afro-American Studies 15); Anthropological Perspectives on American Culture {5}
Anthropology 19; Magic, Witchcraft, and Religion {5} {*}
Anthropology 108; African Societies in a Changing World {5} {*}
Anthropology 114; Introduction to Chinese Society {5} {*}
† Anthropology 117; Traditional Chinese Society {5} {*}
Anthropology 118A; 20th-Century China {5} {*}
Anthropology 128 (same as Communication 115); Ethnographic Film {5}
Anthropology 140 (same as Human Biology 178); Aging: From Biology to Social Policy {5}
Anthropology 141A; Renaissance Europe and Others {5}
† Anthropology 145; Women in Cities {5}
Anthropology 146; Urban Problems in Anthropological Perspective {5}
† Anthropology 147 (same as Feminist Studies 168); Cultural and Feminist Perspectives on Theology {5}
Anthropology 150; American Indian Ways of Knowing {5}
Anthropology 151A; Comparative Cultural Studies {5}
Anthropology 155; Food Production, Poverty, and Famine {5}
† Anthropology 160 (same as Feminist Studies 147A, History and Philosophy of Science 160, Human Biology 170); Gender and Science {5}
Anthropology 164 (same as Human Biology 134); Ecological Anthropology {5} {*}
Anthropology 165; Psychological Anthropology {4} {*}
Anthropology 168 (same as Human Biology 168); Medical Anthropology {5}
† Anthropology 171 (same as Linguistics 154); Language and Gender {4}
Anthropology 178; Introduction to Language Change {4}
Anthropology 187 (same as Human Biology 183); Hunters-Gatherers in Archaeological Perspective {5} {*}
Classics 3; Democracy and Imperialism {5}
Classics 14 (same as Athletics 194); Classical Athletics {5}
Classics 20; Introduction to Classical Archaeology {5}
Classics 101; History of Ancient Greece: Society and Politics from Homer to Alexander {5}
Classics 102; Roman History I: The Republic {5}
Classics 103; Roman History II: The Empire {5}
Classics 105; History and Culture of Egypt {5} {*}
† Classics 117; Greek Religion and Society {5}
Classics 120; Athenian Social History {5}
Classics 125; Ancient Politics {5}
† Classics 190; The Family, Sex, and Marriage in Ancient Rome {5}
Communication 1; Mass Communication and Society {5}
Communication 106; Communication Research Methods {5}
Communication 108; Mass Communication Theory {4}
Communication 157; Public Information Programs {5}
Communication 160; Political Communication {5}
Communication 169 (same as Sociology 133, Science, Technology, and Society 162); Communication, Technology, and Society {5}
Communication 170; Communication and Children {4}
Drama 155; American Drama, 1960s to the Present {5}
Economics 1; Elementary Economics {5}
Economics 113 (same as Science, Technology, and Society 107); Technology and Economic Change {5}
Economics 122; Theory of Capitalist Development {5}
Education 120 (same as Symbolic Systems 20); Problems of Information, Intelligence, and Learning {4}
† Education 197 (same as Feminist Studies 139A, Sociology 134); Education and the Status of Women: A Comparative Perspective \{4\} or \{5\}

Education 255 (same as Psychology 155); Human Abilities \{4\}

English 102 (same as Linguistics 102); History of the English Language \{4\}

† Feminist Studies 101 (same as History 173C); Introduction to Feminist Studies \{5\}

German Studies 31A/131; Central Europe: Geography, Institutions, and Society \{5\}

German Studies 38A/138 (same as Linguistics 75); Introduction to the German Languages \{4\}

German Studies 139 (same as Linguistics 176); Introduction to Germanic Dialects \{4\}

History 155; The Medieval Church and Violence \{5\}

History 24A; Russian Civilization 9th to 17th Centuries \{5\} \{\ast\}

History 80 (same as Latin American Studies 80); Culture, Society, and Politics in Latin America \{5\} \{\ast\}

History 107; Politics and Society in the High Middle Ages: France and Germany 950-1250 \{5\}

History 109; Renaissance \{5\}

History 115 (same as History and Philosophy of Science 121, Science, Technology, and Society 121); Technology and Culture in 19th-Century America \{5\}

History 119; Aristocracy and Absolutism: Early Modern Eastern Europe \{5\}

History 120C; Russia in Revolution \{5\}

History 127D; 20th-Century Germany \{5\}

History 132B; Modern France from the Enlightenment \{5\}

History 134A (same as Science, Technology, and Society 131); The Industrial Revolution \{5\}

History 137; The Holocaust \{5\}

History 141; Yorkist and Tudor England \{5\}

History 142; Revolutionary England 1603-1689 \{5\}

History 145; 20th-Century Britain \{5\}

History 165C; The U.S. in the 20th Century \{5\}

History 172A; America Since 1945 \{5\}

† History 173B (same as Feminist Studies 122); U.S. Women’s History 1820-1980 \{5\}

History 176; Spain in America 1492-1825 \{5\}

History 179; History of Mexico \{5\}

History 186A (same as Anthropology 120); Modern India \{5\} \{\ast\}

† History 187C; Women in the Contemporary Middle East \{5\} \{\ast\}

History 188B; Jews in the Medieval World \{5\}

History 188C; Jews in the Modern World \{5\}

† History 205A; Private Lives: Public Stories \{5\}

† History 207 (same as Feminist Studies 154); Topics in Comparative Women’s History \{5\}

† History 211; Body, Gender, and Society in Medieval Europe \{5\}

† History 230A (same as French 189A); Women and Gender in Modern France \{5\}

History 233A; Modern German Jewry \{5\}

† History 287A; Modern Jewish Identity \{5\}

History and Philosophy of Science 152 (same as History 133, Human Biology 152, Philosophy 152, Science, Technology, and Society 130); The Darwinian Revolution \{4\}

Human Biology 2B or 3B or 4B; Human Biology Core \{4\} or \{5\}

† Human Biology 169 (same as Feminist Studies 169); Women, Sexuality, and Health \{4\}

Industrial Engineering 107; Work, Technology, and Society \{5\}

Latin American Studies 191; Problems in U.S.-Mexico Relations \{5\}

Linguistics 1; Introduction to Linguistics \{4\}

Linguistics 60 (same as Anthropology 178); Introduction to Language Change \{4\}

Linguistics 70; Structure of English Words \{4\}

Linguistics 72 (same as English 105); Point of View in Fiction: A Linguistic Approach \{4\}

Linguistics 73; African-American Vernacular English \{4\}

Linguistics 150; Introduction to Sociolinguistics \{5\}

Linguistics 153; Inter- and Intra-Ethnic Variation of Urban Vernacular English \{4\} or \{5\}

Linguistics 162; English Transplanted, English Transformed: Pidgins and Creoles \{4\} \{\ast\}

Philosophy 181; Philosophy of Language \{4\}

Political Science 1; Major Issues of American Public Policy \{5\}

Political Science 10; American National Government \{5\}

Political Science 20; Introduction to Comparative Politics \{5\}

Political Science 25; Colonialism and Nationalism in the Third World \{5\} \{\ast\}

Political Science 35; International Politics \{5\}

Political Science 113A; Politics and Development in Latin America \{5\}

Political Science 114K; The Political Economy of Development \{5\} \{\ast\}

Political Science 115; Politics in the People’s Republic of China \{5\} \{\ast\}

Political Science 116B; European Politics and Society II \{5\}

Political Science 117R; The Role of the Military in Politics \{5\}

Political Science 118B; Southern Africa: Race, Class, and Political Change \{5\} \{\ast\}
Political Science 119A; Soviet History 1917-1993 {5}
Political Science 122G; Political Economy of Contemporary Europe {5}
Political Science 134A; Strategy, War, and Politics {5}
Political Science 170; Judicial Politics and Constitutional Law {5}
Political Science 181; African Americans and the Political System {5}
Political Science 182F (same as American Studies 179, Law 106); Introduction to American Law {5}
Psychology 1; Introduction to Psychology {4}
Psychology 102; Perception {4}
Psychology 106; Introduction to Cognitive Psychology {4}
† Psychology 111; Developmental Psychology {4}
† Psychology 116 (same as Feminist Studies 126); Psychology of Gender {4}
Psychology 120; Cognitive Development {4}
† Psychology 121; Social Psychology {4}
Psychology 136; Abnormal Psychology {4}
Psychology 146 (same as Linguistics 145); Language and Thought {4}
Sociology 1A,B,C; Introduction to Sociology {5}
† Sociology 105; Status, Friendship, and Social Pressure: An Experiential Approach {4} or {5}
Sociology 110; Politics and Society {5}
Sociology 120; Interpersonal Relations {4} or {5}
† Sociology 140; Introduction to Social Stratification {5}
† Sociology 142 (same as Feminist Studies 134); Sociology of Gender {5}
Sociology 145; Race and Ethnic Relations {5}
Sociology 155; Children and Society {5}
Sociology 160; Formal Organizations {5}
Sociology 170; Classics of Modern Social Theory {5}
Science, Technology, and Society 101 (same as Engineering 130); Science, Technology, and Contemporary Society {5}

In addition to those courses marked with a dagger (†) in Areas 2-9, the following courses will also satisfy the Gender Studies Requirement:

History 184B; Women, Gender, and Jewish Modernity
Human Biology 150 (same as Feminist Studies 145); Gender-Specific Perspectives on Birth Control
Religious Studies 128 (same as Feminist Studies 151); Women and Judaism

Political Science 163 (same as Feminist Studies 102C); Contemporary Issues in Feminist Thought

OVERSEAS STUDIES—1994-95

BERLIN

AREA 7; LITERATURE AND FINE ARTS
( Area 2 under the 1980 DR system)

101A (same as Drama 101A, German Studies 195); German Theater
117V (same as Art 173Y, Science, Technology, and Society 117V); Industrial Revolution and its Impact on Art, Architecture, Theory
120X (same as Art 120X); New Ways of Seeing
129E (same as German Studies 129E); Modernism and Metropolis
134B (same as German Studies 134B); East and West German Literature
143U (same as Art 174Y, History 229V, Urban Studies 143U); Architecture and the City, 1871-1990; Berlin as Nucleus of Modernity
177U (same as Urban Studies 177U); From Modernism to Post-Modernism: Berlin Architecture
179B (same as German Studies 179B); Split Images: Post-War German Film

AREA 8; PHILOSOPHICAL, SOCIAL, AND RELIGIOUS THOUGHT
( Area 3 under the 1980 DR system)

100X (same as Political Science 161X, History 129V, Economics 100X); History of German and European Economic Philosophy

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
( Area 5 under the 1980 DR system)

128X (same as Economics 128X); Transition in Germany and Eastern Europe
148U (same as History 226V, Urban Studies 148U); The City, 1150-1870: The Nucleus of Bourgeois Culture
153X (same as Economics 126X, Political Science 153X); From Socialism to Capitalism in East Germany
176B (same as German 176B); Film and Political Culture in Germany
220X (same as Political Science 220X); The Politics of European Integration
177A (same as German Studies 177A); Culture and Politics in Modern Germany

FLORENCE

AREA 7; LITERATURE AND FINE ARTS
( Area 2 under the 1980 DR system)

110Y (same as Art 110Y); Italian Painting and Sculpture as Historical Documents
110Z (same as Art 110Z); Florentine Painting and Sculpture from 1260 to 1530
132F (same as Italian 132F); Representations of Italy through the Eye of the Camera
AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Area 5 under the 1980 DR system)
106V (same as History 106V, Political Science 158X); Italy: From an Agrarian to a Post-Industrial Society
107V (same as History 107V); States and Society in Renaissance Italy
141A (same as Anthropology 141A); Renaissance Europe and Others
145X (same as Political Science 145X); The Integration of Europe
159X (same as Economics 159X); The Political Economy of Industrial Change
212X (same as Political Science 212X); The European Community: Institutions and Policies

KYOTO
AREA 6: TECHNOLOGY AND APPLIED SCIENCE
(Area 8 under the 1980 DR system)
40 (same as Engineering 40); Introductory Electronics
198K (same as Engineering 198K); Japanese Technology Management

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Area 5 under the 1980 DR system)
215X (same as Political Science 215X); The Political Economy of Japan

MOSCOW
AREA 9: SOCIAL PROCESSES AND INSTITUTIONS
(Area 5 under the 1980 DR system)
119X (same as Political Science 119X); Russian Politics

OXFORD
AREA 5: NATURAL SCIENCES
(Area 7 under the 1980 DR system)
190B (same as Physics 190B); Great Ideas in Physics and Cosmology

AREA 7: LITERATURE AND FINE ARTS
(Area 2 under the 1980 DR system)
120Y (same as Art 120Y); Art and Society in Britain: 1730-1914
148Z (same as Drama 158M, English 148Z); Modern Drama and Its Roots
†157E (same as Drama 157E); Black Theater in England
158J (same as Drama 158J); Jacobean Drama 1600-1642
254Z (same as Drama 158D, English 254Z); Drama in Britain Today

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Area 5 under the 1980 DR system)
40X (same as Political Science 40X); International Relations of the Middle East
102V (same as History 102V); International Politics in the Era of Two World Wars
131W (same as History 140V, Sociology 131W); English Social History from 1800s to 1980s
141V (same as History 141V, Political Science 148X); European Imperialism and the Third World, 1870-1970
146V (same as English 189Y, History 146V); Modern African History Through the African Novel
147X (same as Political Science 147X); European Integration
167X (same as Economics 167X); European Economics in a Changing World
243V (same as History 243V, Urban Studies 146U); Urban History in Britain 1500 to the 20th Century

PARIS
AREA 7: LITERATURE AND FINE ARTS
(Area 2 under the 1980 DR system)
120X (same as Art 120X); French Painting From 1780 - 1900
123Y (same as Art 123Y); 19th-Century French Sculpture
178U (same as Art 175Y, Urban Studies 178U); The Architect of Paris

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Area 5 under the 1980 DR system)
122X (same as Economics 122X); 20th-Century French and European Economics
211X (same as Political Science 211X); Political Attitudes and Behavior in Contemporary France
230V (same as History 230V); Social History of Modern France

SANTIAGO
AREA 6: TECHNOLOGY AND APPLIED SCIENCE
(Area 8 under the 1980 DR system)
106Z (same as Biology 106Z, Human Biology 106H, Latin American Studies 122X); Man-Environment Interactions: Case Studies from Central Chile

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Area 5 under the 1980 DR system)
120X (same as Anthropology 104X, Latin American Studies 120X, Spanish 290Z); Modernization and Culture in Latin America
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